1948

LIGHTWEIGHT

FIREPROOF

RIGID

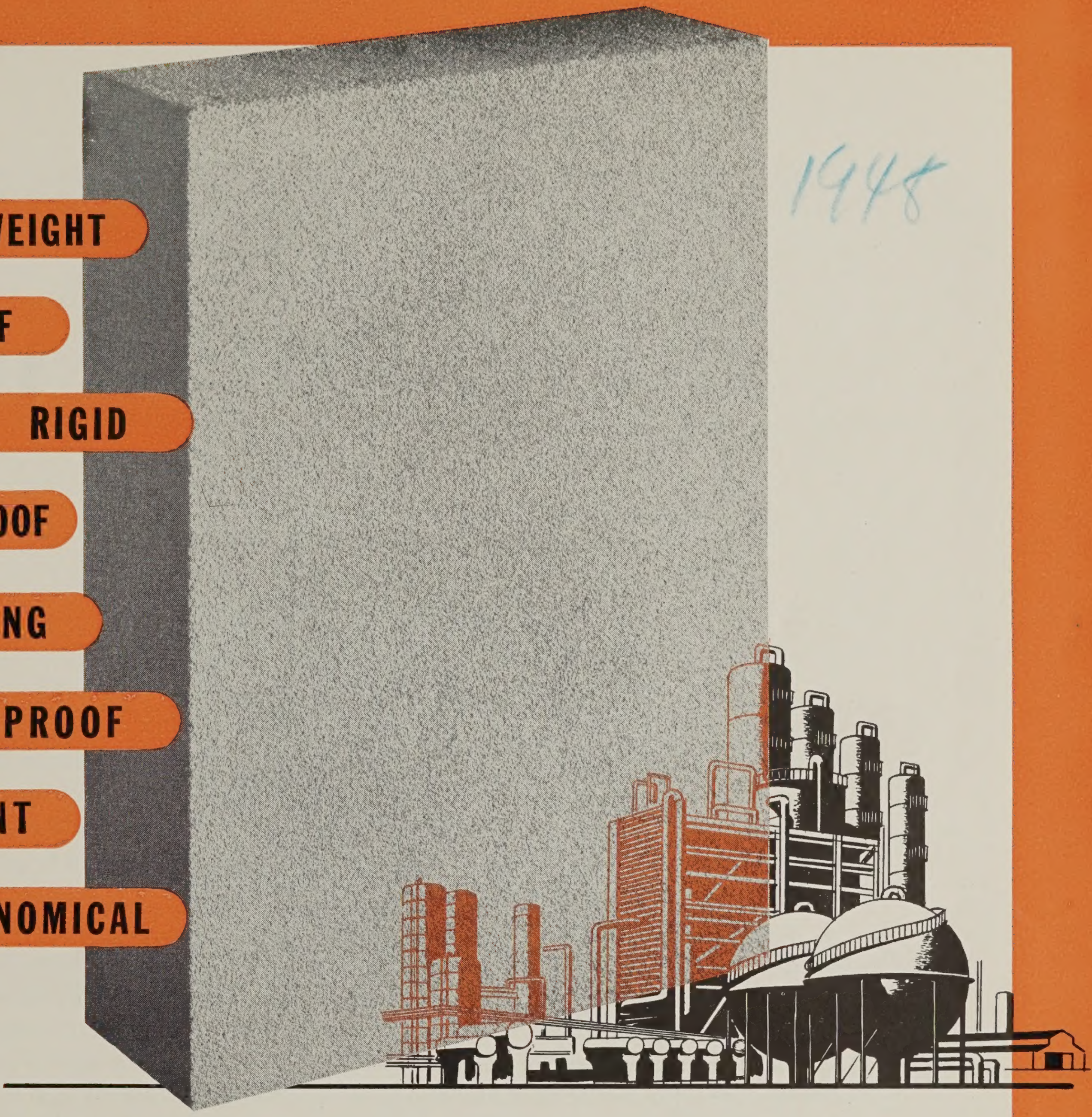
MOISTUREPROOF

STRONG

ACIDPROOF

EFFICIENT

ECONOMICAL



PC

FOAMGLAS

T. M. REG. U. S. PAT. OFF.

INSULATION FOR TANKS

TOWERS, DUCTS AND BREECHING

With PC FOAMGLAS *first cost is last cost*

PITTSBURGH CORNING CORPORATION

632 Duquesne Way, Pittsburgh 22, Pa.

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FOREWORD

SINCE 1940, this company has been manufacturing PC Foamglas, a cellular glass insulating material for industrial and commercial uses. In addition to supplying heavy demands of the Armed Forces for use as a flotation material, we have been able to provide sufficient quantities for use as industrial insulation to prove the outstanding qualities of the material for this purpose.

Keeping pace with the ever-changing requirements of wartime industry has called for a vast amount of research. Materials are tested today as never before, even for applications not originally intended. They cannot be only *reasonably* correct; abnormal conditions require scientific exactness. Constant research has developed an ever-increasing demand for PC Foamglas for a wide variety of applications. Among these is the insulating of high temperature tanks, towers, and ducts. It is the purpose of this booklet to show the proper method for installing Foamglas to insure maximum utilization of its unique physical properties.

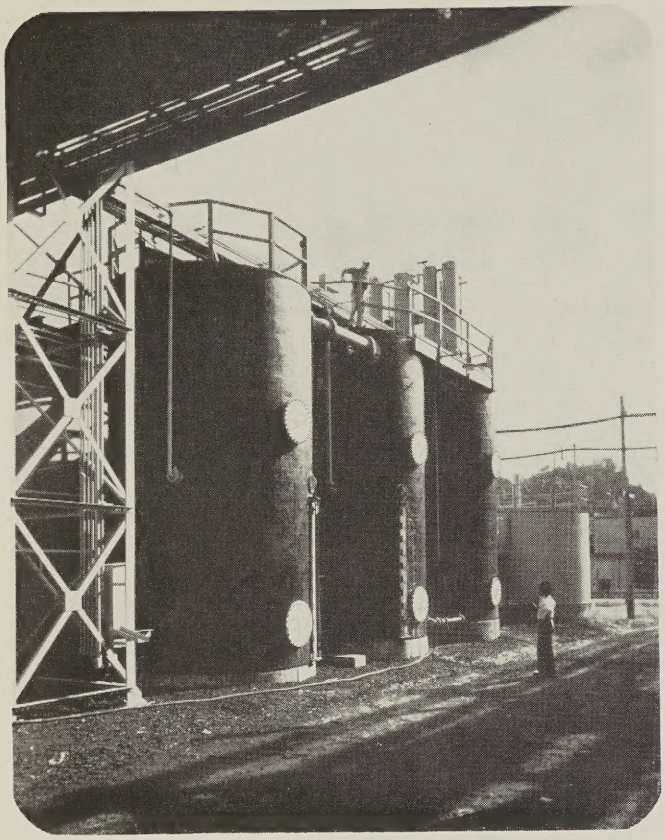
These typical specifications and details have been prepared by our staff of engineers and laboratory technicians in collaboration with some of the larger industrial insulation applicators, and conform to the specifications of many chemical process industry contractors. They are practical in every respect and may be adapted to any type of equipment comparable to the specific types mentioned. If they do not apply to your particular problem, we will be glad to cooperate with you.

Pittsburgh Corning Corporation
Engineering Department

How PC FOAMGLAS is made . . .

This picture shows the even texture of PC Foamglas. The magnification shows its cellular structure.

THIS new permanent insulating material is made by adding finely divided carbon to ground glass and subjecting the mixture to controlled high temperature heat treatment. This causes the charge to expand into a mass of black foam which fills the mould to capacity and solidifies. The result is a rigid material of which one cubic foot contains more than ten million cells of inert gas hermetically sealed in pure glass. When moulds are stripped, the blocks of Foamglas are annealed, then cut and shaped by face and edge trimmers. After final inspection, the blocks are placed in standard packages of a size convenient for shipping and for handling on the job.



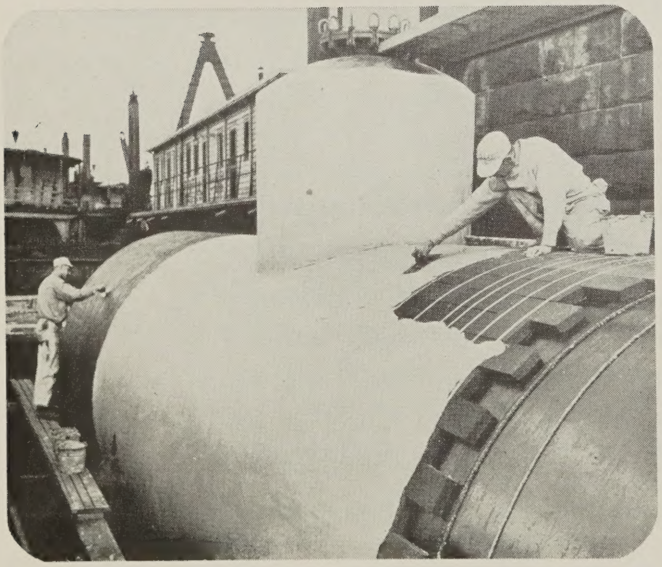
INCOMBUSTIBLE INSULATION

An outstanding quality of PC Foamglas, particularly as it relates to the petroleum industry, is its resistance to fire. In tests conducted by the Pittsburgh Testing Laboratory, Foamglas successfully withstood a 24-hour exposure to a temperature of 1200°F. The official report stated, "At no time during the exposure was there any evidence of combustion; and during the test, there was no loss in weight of the specimen, since weight before and after checked within less than 0.3 percent."

PC Foamglas meets Underwriters' Laboratories, Inc. Specifications. Classification in Guide No. 540 Io, File R-2844, dated June 12, 1945.

PERMANENT INSULATION

The basic materials and cellular structure of the strong, rigid blocks of Foamglas give it qualities not possessed by any other insulating material. It retains its insulating value permanently. Foamglas is waterproof, vaporproof, and fireproof. It is impervious to all acids except hydrofluoric and glacial phosphoric. Basic in character, it will not cause or accelerate corrosion as it is chemically stable.



THE WORKABLE INSULATION

Lightweight and easy to handle, Foamglas can be readily cut with a knife in straight lines or odd shapes. Because Foamglas is friable and crushes locally with point loading, it yields readily to such surface irregularities as rivet heads and welds so that it can be pressed close to the area to be insulated without breaking or cracking. It can be readily shaped to curved surfaces of any radii.

Its outstanding desirable properties make Foamglas an ideal permanent insulation for use in Absorption, Alkylation, Rectification, Fractionation, Concentration, Evaporation, Isomerization, Drying, Distillation, Hydrogenation, Extraction, Crystallation and Molecular Selection Processes, Thermal and Catalytic Cracking, or any place where heat is conserved, controlled, or excluded in the Petroleum, Chemical or Petro-Chemical field.

UNIQUE PROPERTIES

Exceptionally low thermal conductivity, for this type of material, is an outstanding characteristic of Foamglas. The thermal conductivity curve is practically a straight line from 100°F. below zero to 500°F. above zero mean temperature wet or dry.

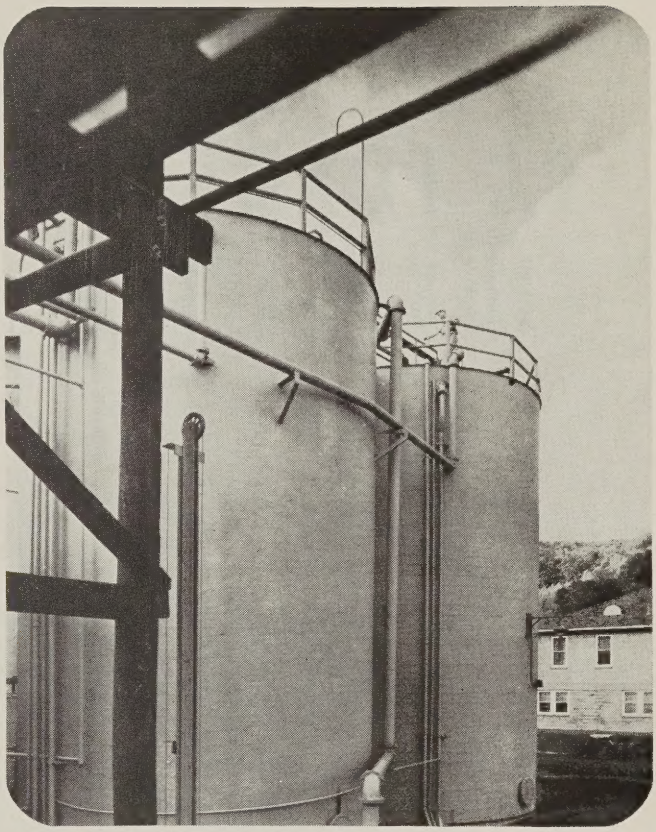
The high compressive strength (150 lbs. per sq. in. average) of Foamglas has been demonstrated by hundreds of installations in floors, roofs, and walls in a wide variety of industrial plants.

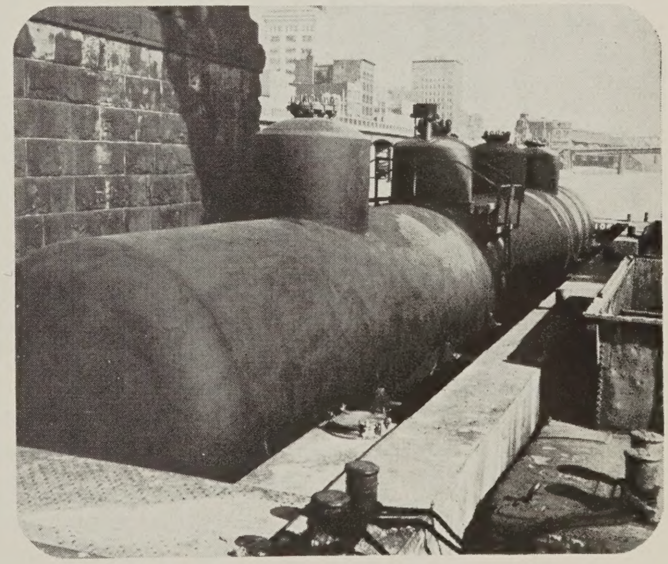
EFFICIENT INSULATION

The most important property of an insulating material is its thermal conductivity coefficient. For commercial products commonly classified as insulating materials, this coefficient ranges between .25 and .50 at normal temperatures. However, this coefficient by itself can not be taken as the sole criterion of an efficient material. Total thickness obviously is a factor but at least two other properties, moisture-absorption and durability, are important.

The reason for this is that the conductivity of most, if not all, of the present insulating materials is increased considerably by moisture, and deteriorates when the moisture condenses within them. To a large extent this point is critical in comparing the physical performance of Foamglas (which is moistureproof) to other insulating materials.

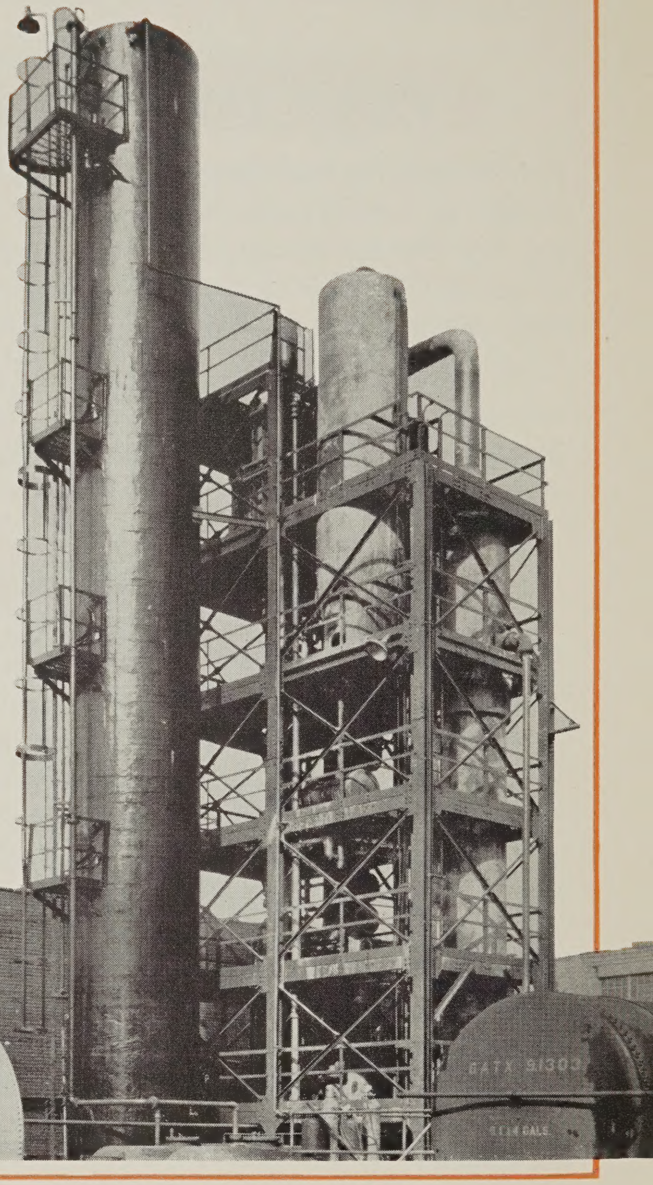
Insulation industry literature and specifications practically all contain warnings of the adverse effect of moisture on insulating value. This subject has been the object of a great deal of past and present research in the insulation field. It is only logical that a material that has no water absorption or water vapor permeability should, over a long period of time, be more efficient as an insulator than other material that has initially lower conductivity, but eventually a much higher one due to moisture gain.





PC FOAMGLAS INSULATION

. . . for Tanks and Towers



SINCE most equipment of this type is located outdoors and exposed to the weather, durability becomes an important factor. Very few materials exist that can withstand, over prolonged periods, the accumulation of moisture and still serve effectively their original purpose. This is particularly true where freezing temperatures exist.

The destructive forces set up within a moisture-laden material exert a powerful disintegrating action. Where high porosity is necessary, as in most thermal insulators, the exclusion of moisture is difficult. Foamglas, being inherently moistureproof, should outlast any equipment.

Where exact temperature control is necessary, the constant thermal conductivity value of Foamglas is especially important.

COMPARE THESE QUALITIES OF PC FOAMGLAS with other insulating materials

RIGIDITY

PC Foamglas is more rigid and stronger than other materials of this type regularly used for insulation. It will support its own weight on any type of equipment without any intermediate support. While it is not recommended as a structural load-bearing material, it will support evenly distributed loads of 5,000 pounds per sq. ft. when properly protected from point loading.

DURABILITY

Foamglas is impervious to water and all acids (except hydrofluoric and glacial phosphoric), concentrated or dilute. It is incombustible and meets the specifications of the Underwriters' Laboratories, Inc.

ECONOMICAL

Being rigid and uniform in size, it is easy to apply. It can be easily cut to fit closely around manholes or connections. One of the most important advantages is the ease with which a vessel insulated with Foamglas can be repaired. The Foamglas can be cut away and welding, drilling, tapping or other repair work made without taking special precautions to keep the exposed insulation dry. Foamglas is also supplied in circular segments to fit the surface of tanks of any diameter in single or multiple layers. It is not necessary to have intermediate angle iron supports. The conventional "cover-up" coat of insulating cement is not needed. Small expansion joints can be made quickly by shiplapping the material on the job.

Excessive material to cover breakage in handling and shipping is not necessary as this loss with Foamglas is negligible.

NON-CORROSIVE

This inorganic material, being pure glass, cannot cause or accelerate corrosion. By sealing the joints, it can be used to protect equipment from moisture or corrosive acids and fumes.

MOISTUREPROOF

More than ten separate tests, conducted by private, federal, and independent laboratories, failed to find any water absorption or vapor passage. One test was conducted continuously for 246 days. In another, a specimen of Foamglas failed to show any moisture gain under 50 lbs. per sq. in. pressure.

CONSTANT INSULATION FACTOR

The ability of Foamglas to retain indefinitely a constant thermal conductivity factor, wet or dry, makes it the preferred insulation where precision temperature control is desired.

SIZES AVAILABLE · PACKING · ORDERING

(Subject to change without notice)

STANDARD BLOCKS

Sizes	Pieces per Carton	Sq. Ft. per Carton	Approximate Weight per Carton
12″ x 18″ x 2″	12	18	40.5 lbs.
12″ x 18″ x 3″	8	12	35.0 lbs.
12″ x 18″ x 4″	6	9	38.5 lbs.
12″ x 18″ x 4½″	6	9	41.0 lbs.

SPECIAL RECTANGULAR BLOCKS

Sizes	Pieces per Carton	Sq. Ft. per Carton	Approximate Weight per Carton
6″ x 18″ x 2″	24	18	42.0 lbs.
6″ x 18″ x 3″	16	12	37.0 lbs.
6″ x 18″ x 4″	12	9	40.0 lbs.
3″ x 18″ x 2″	48	18	43.0 lbs.
3″ x 18″ x 3″	32	12	38.0 lbs.
3″ x 18″ x 4″	24	9	41.0 lbs.

BEVEL-EDGE BLOCKS (2 edges)—Furnished on special order only

Sizes	Pieces per Carton	Sq. Ft. per Carton	Approximate Weight per Carton
12″ x 18″ x 2″	12	18	40.5 lbs.
12″ x 18″ x 3″	8	12	35.0 lbs.
12″ x 18″ x 4″	6	9	38.5 lbs.
6″ x 18″ x 2″	24	18	42.0 lbs.
6″ x 18″ x 3″	16	12	37.0 lbs.
6″ x 18″ x 4″	12	9	40.0 lbs.
3″ x 18″ x 2″	48	18	43.0 lbs.
3″ x 18″ x 3″	32	12	38.0 lbs.
3″ x 18″ x 4″	24	9	41.0 lbs.

When ordering indicate size required from above table giving radius to outside face of tank or tower. The factory will bevel the two 18-inch edges to conform to this radius. Where two or more layers of insulation are used, state quantity required per layer and radii to outside face of the additional layers.

CIRCULAR SEGMENT BLOCKS

Furnished on special order only. Supplied only in block size 12″ x 18″ cut from standard thicknesses of 2″, 3″, 4″ and 4½″. The net thickness will vary with the radii. Supplied with both 18-inch edges bevelled and either one or both faces shaped. When ordering indicate size required and radius of outside face of tank or tower. Where two or more layers of insulation are used state quantity required per layer.

NOTE—*Dimensions for all size blocks are subject to a tolerance of 1/16″ plus or minus.*

PC PITTCOTE FINISH

We have included this weatherproofing in our specifications for protection to the steel bands, appearance, and to provide a smooth surface for painting.

PC Pittcote is a combination of emulsified asphalt with special asbestos fibers and fillers ready for application. It is black in color and possesses sufficient tensile strength and elasticity to withstand normal movement without cracking or rupturing. It bonds well to Foamglas and forms a monolithic coating that does not crack and is not affected by temperature changes.

It will not support combustion and is accepted as a fireproof finish for use in refineries and other industrial plants where fire hazards are a menace.

It is highly resistant to caustic solutions.

It is a durable weatherproof coating of a troweling consistency and is particularly suitable for the elimination of air infiltration and for the protection of the insulation supports.

Container Size	Approximate Net Weights	Approximate Shipping Weights
5 gal.	50 lbs.	55 lbs.
10 gal.	100 lbs.	110 lbs.
30 gal.	300 lbs.	330 lbs.
55 gal.	500 lbs.	550 lbs.

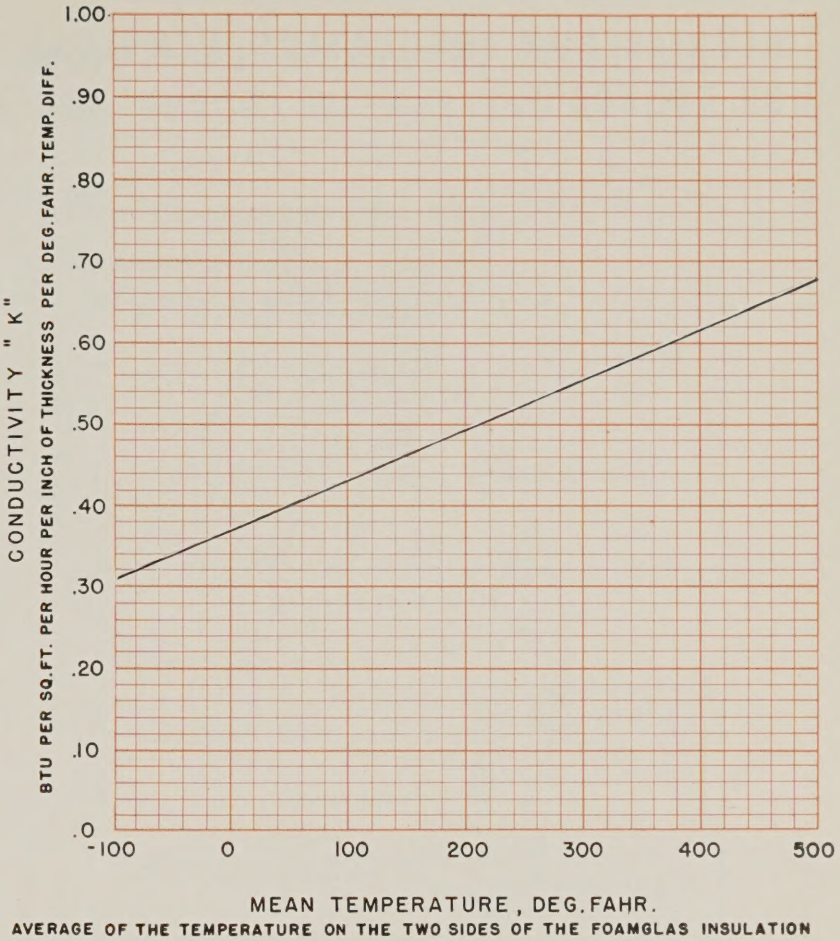
Shipped in steel containers. 30 gallon and 55 gallon steel containers are returnable.

As Pittcote Finish contains water, it should not be applied where the temperature during application will be below 40°F. Store in warm place to prevent freezing.

Coverage: Approximately 1 lb. per sq. ft. for each 1/8″ thick coat (when wet).

THERMAL CONDUCTIVITY

Variation with Temperature

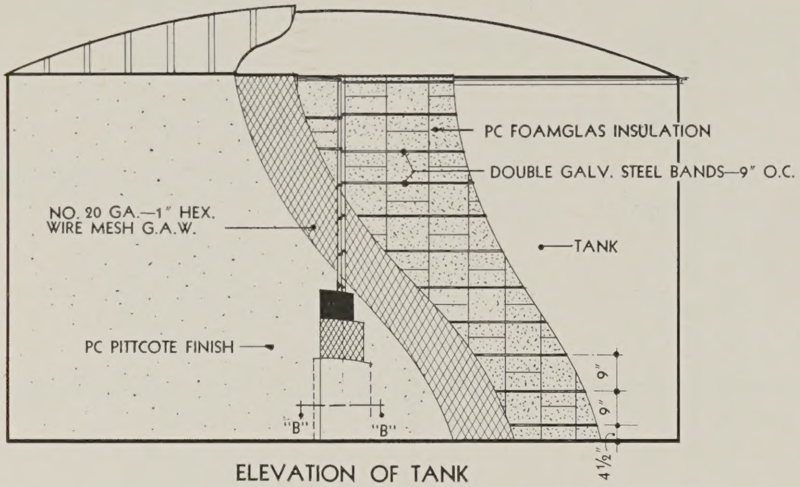


PHYSICAL PROPERTIES

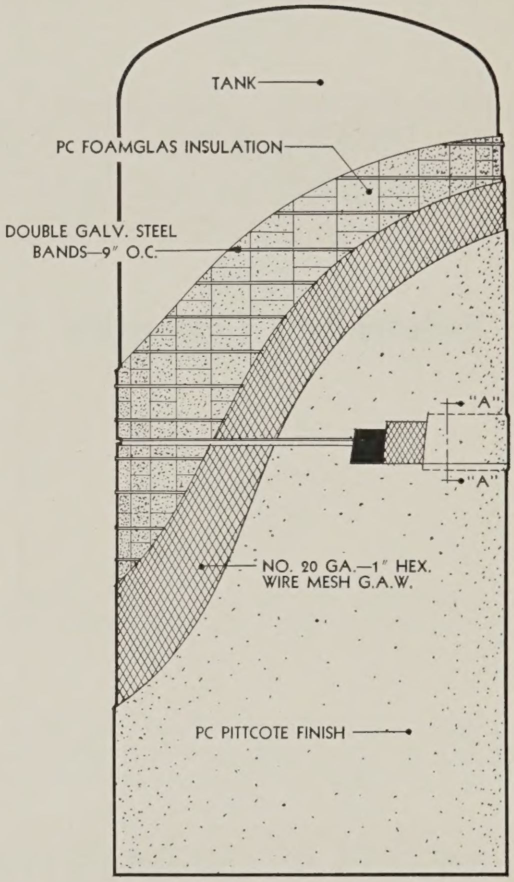
Absorption	.03 lbs. per sq. ft. of surface area (all at surface)
Capillarity	0
Coefficient of Expansion	.000005 Inches or Feet per °F. temperature change
Combustibility	Incombustible
Composition	Inorganic (glass)
Compressive Strength	150 lbs. per sq. in.
Electrical Resistivity	The Specific Resistance in ohms/cm^3 = 3.6 x 10^{10} at 20°C.
Flexural Strength (Modulus of Rupture)	90 lbs. per sq. in.
Hygroscopicity	0% increase in weight after 33 days in 90% Relative Humidity Air
Impact Strength	66 foot pounds
K (Conductivity at 50° F. Mean Temp.)	0.40 B.t.u./Hr./Sq. Ft./°F./In.
K (Conductivity at 300° F. Mean Temp.)	0.55 B.t.u./Hr./Sq. Ft./°F./In.
Modulus of Elasticity	163,000 lbs. per sq. in.
Resistance to Acids	Impervious to all Acids and Acid Fumes except Hydrofluoric and Glacial Phosphoric
Specific Gravity	.168
Specific Heat	.163 B.t.u. per pound
Thermal Diffusivity	.53 per sq. ft. per day per foot.
Water Penetration	Depth of Open Surface Cells about 1/32 in.
Water Vapor Diffusivity	0
Weight	10.5 lbs. per cu. ft.

The above properties are based on an average weight of 10.5 lbs. per cu. ft.
The material is supplied in a weight range from 9.5 lbs. to 11.5 lbs. per cu. ft.

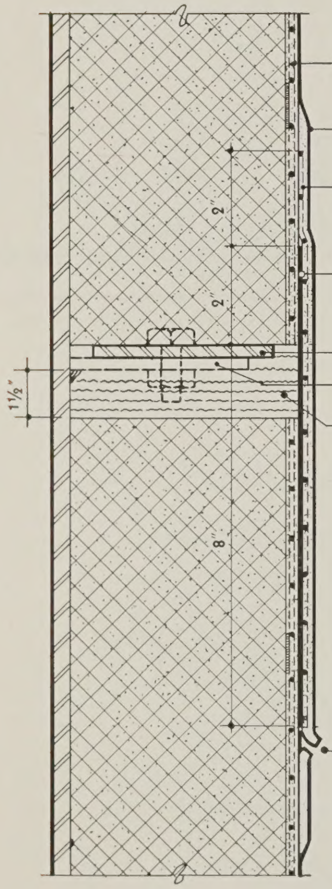
DETAILS FOR INSULATING VERTICAL TANKS AND TOWERS UP TO 800°F.


PC FOAMGLAS INSULATION
DOUBLE GALV. STEEL BANDS—9″ O.C.
NO. 20 GA.—1″ HEX. WIRE MESH G.A.W.
TANK
PC PITTCOTE FINISH
"B"
"B"
9″
9″
4½″

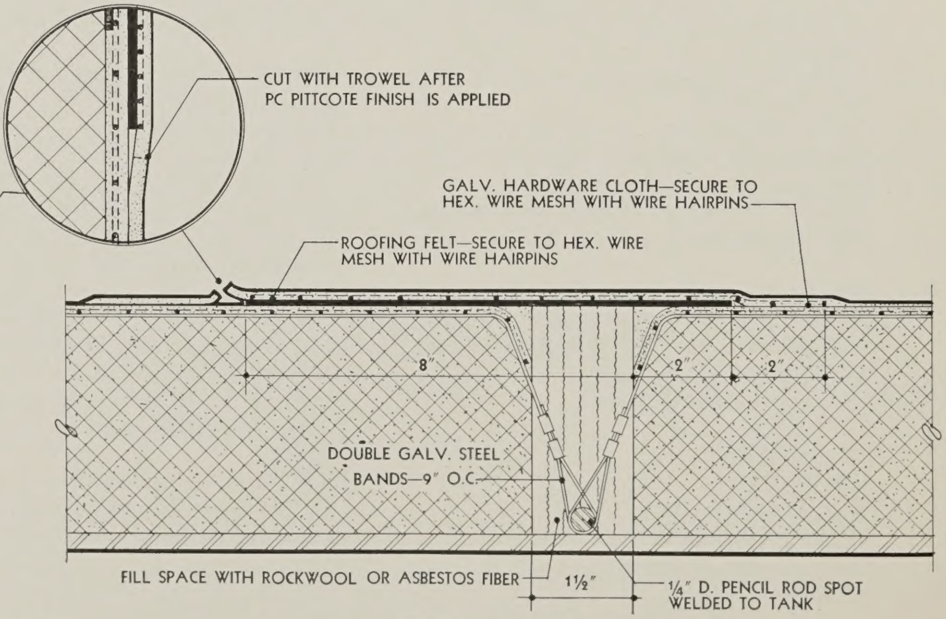
ELEVATION OF TANK


TANK
PC FOAMGLAS INSULATION
DOUBLE GALV. STEEL BANDS—9″ O.C.
"A"
"A"
NO. 20 GA.—1″ HEX. WIRE MESH G.A.W.
PC PITTCOTE FINISH

ELEVATION OF TOWER


NO. 20 GA.—1″ HEX. WIRE MESH G.A.W.
PC PITTCOTE FINISH
GALV. HARDWARE CLOTH—SECURE TO HEX. WIRE MESH WITH WIRE HAIRPINS
ROOFING FELT—SECURE TO HEX. WIRE MESH WITH WIRE HAIRPINS
BAR TYPE SUPPORT RING
TYPE "A" CLIP FOR SUPPORT RING
FILL SPACE WITH ROCKWOOL OR ASBESTOS FIBER
2″
2″
1½″
8″

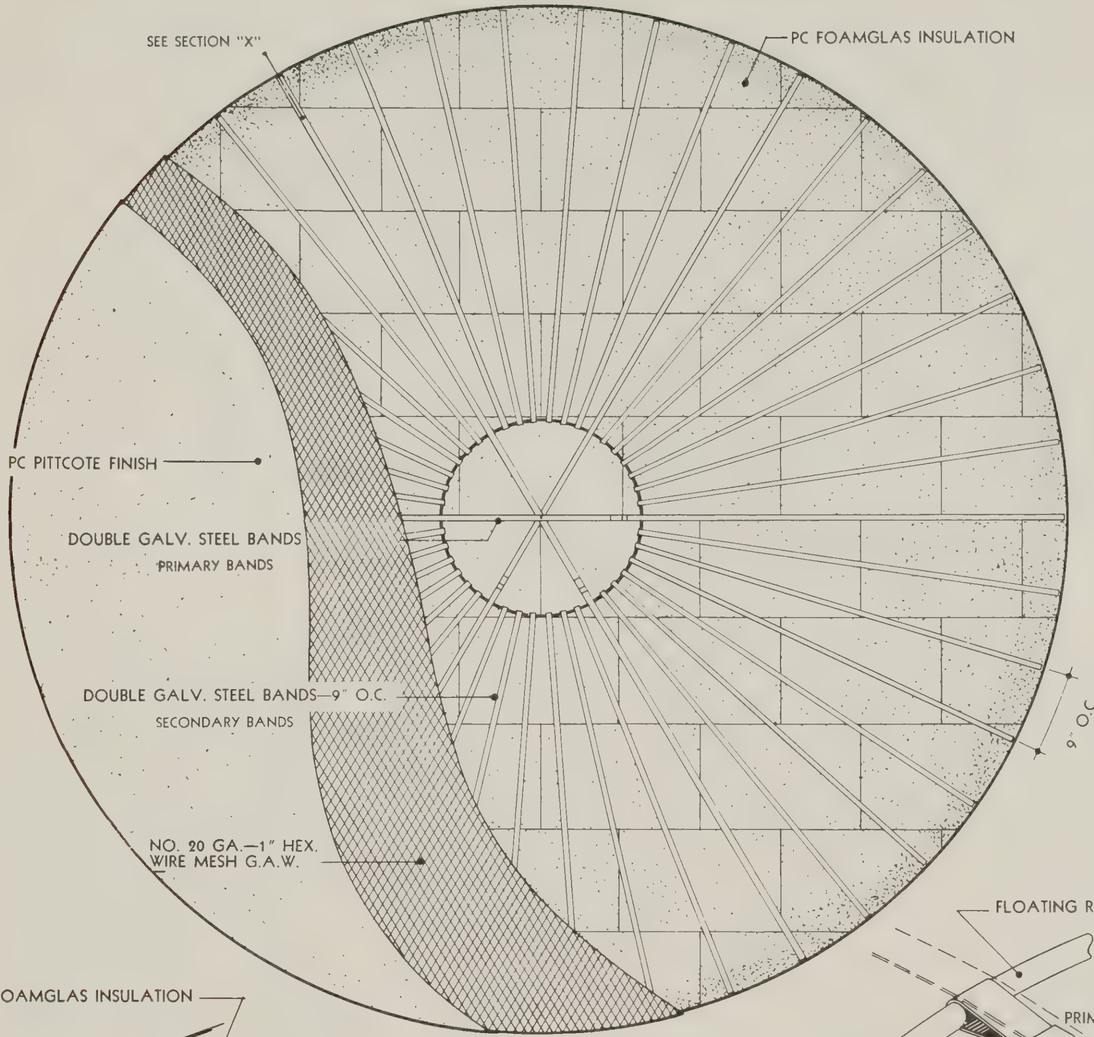
SECTION "A—A"


CUT WITH TROWEL AFTER PC PITTCOTE FINISH IS APPLIED
GALV. HARDWARE CLOTH—SECURE TO HEX. WIRE MESH WITH WIRE HAIRPINS
ROOFING FELT—SECURE TO HEX. WIRE MESH WITH WIRE HAIRPINS
8″
2″
2″
DOUBLE GALV. STEEL BANDS—9″ O.C.
FILL SPACE WITH ROCKWOOL OR ASBESTOS FIBER
1½″
¼″ D. PENCIL ROD SPOT WELDED TO TANK

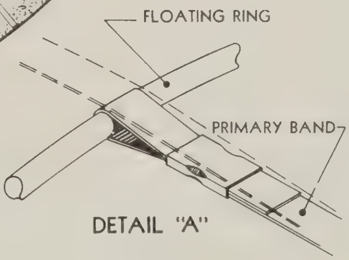
SECTION "B—B"

For Specifications see page 19

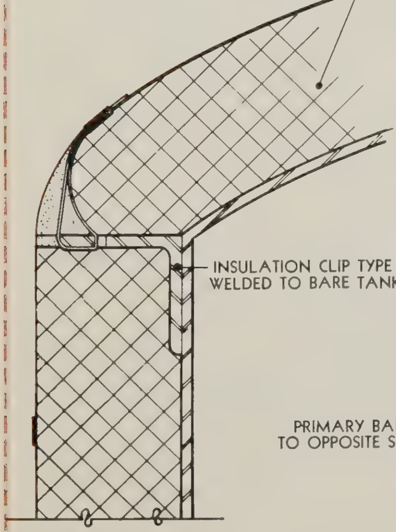
DETAILS FOR INSULATING ELLIPTICAL HEADS OF VERTICAL OR HORIZONTAL TANKS UP TO 800°F. WITH STEEL BANDS



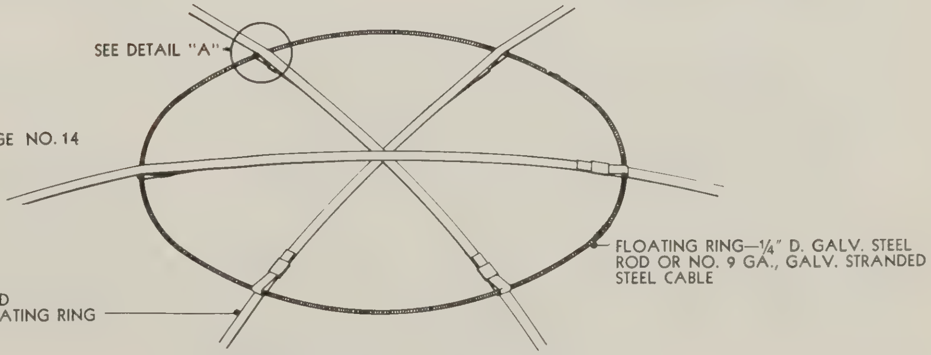
TOP VIEW OF TANK



DETAIL "A"


PC FOAMGLAS INSULATION
INSULATION CLIP TYPE NO. 2, PAGE NO. 14
WELDED TO BARE TANK 9" O.C.

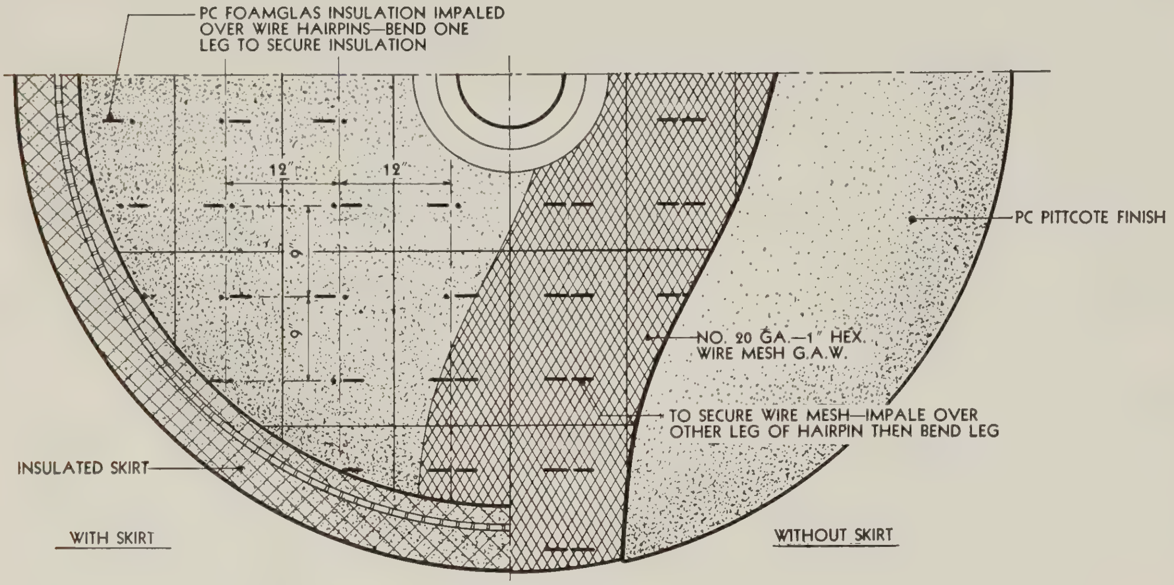
SECTION "X"


SEE DETAIL "A"
FLOATING RING—¼" D. GALV. STEEL ROD OR NO. 9 GA., GALV. STRANDED STEEL CABLE
PRIMARY BANDS SECURED TO OPPOSITE SIDE OF FLOATING RING

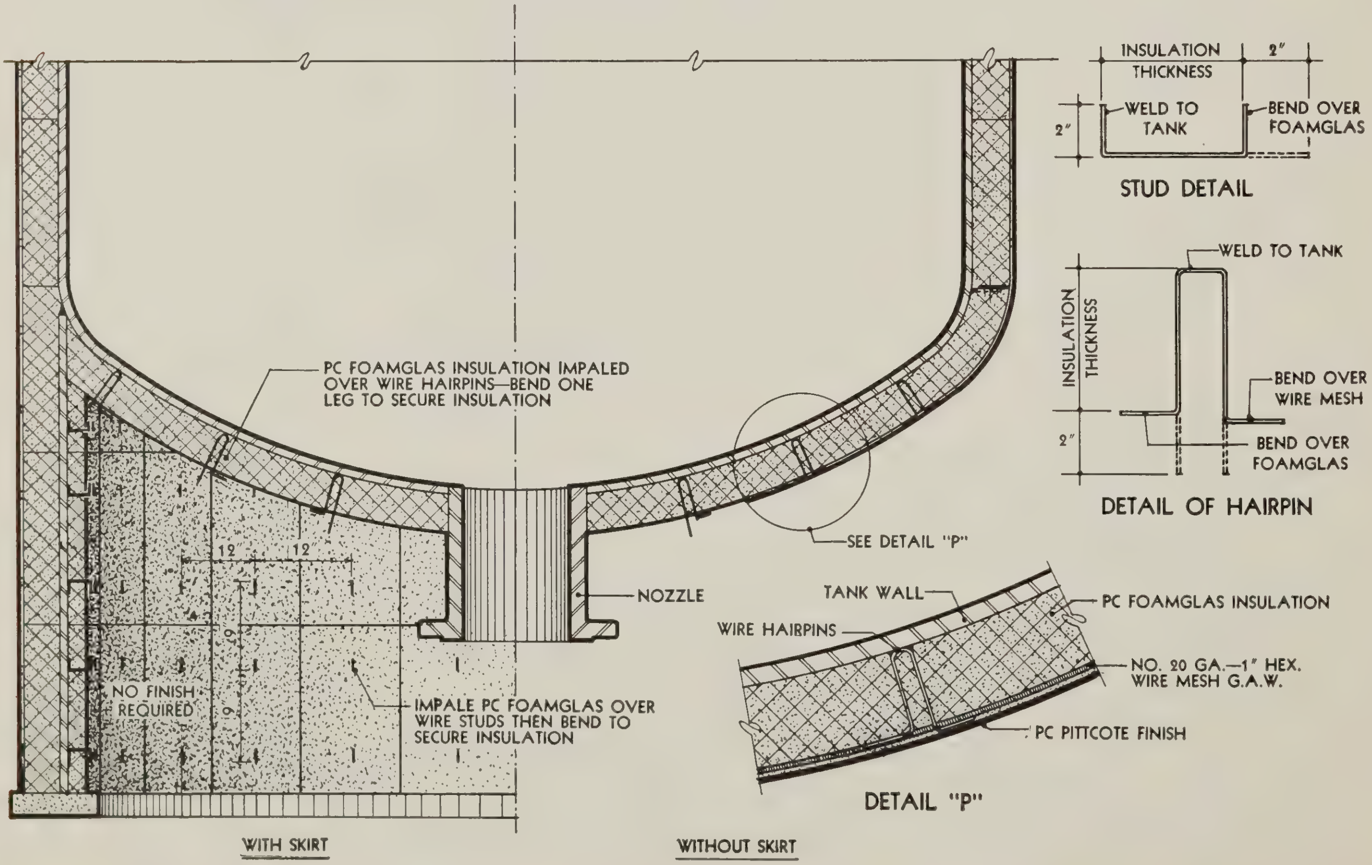
ISOMETRIC DETAIL OF FLOATING RING & PRIMARY BANDS

For Specifications see pages 19 & 21

DETAILS FOR INSULATING TANKS AND TOWERS UP TO 800°F. WITH WIRE STUDS AND HAIRPINS


PC FOAMGLAS INSULATION IMPALED OVER WIRE HAIRPINS—BEND ONE LEG TO SECURE INSULATION
12"
12"
9"
9"
PC PITTCOTE FINISH
NO. 20 GA.—1" HEX. WIRE MESH G.A.W.
TO SECURE WIRE MESH—IMPALE OVER OTHER LEG OF HAIRPIN THEN BEND LEG
INSULATED SKIRT
WITH SKIRT
WITHOUT SKIRT

INVERTED PLAN OF INSULATION ON HEAD & SKIRT


PC FOAMGLAS INSULATION IMPALED OVER WIRE HAIRPINS—BEND ONE LEG TO SECURE INSULATION
12"
12"
9"
9"
NOZZLE
SEE DETAIL "P"
NO FINISH REQUIRED
IMPALE PC FOAMGLAS OVER WIRE STUDS THEN BEND TO SECURE INSULATION
WITH SKIRT
WITHOUT SKIRT
TANK WALL
WIRE HAIRPINS
PC FOAMGLAS INSULATION
NO. 20 GA.—1" HEX. WIRE MESH G.A.W.
PC PITTCOTE FINISH

DETAIL "P"

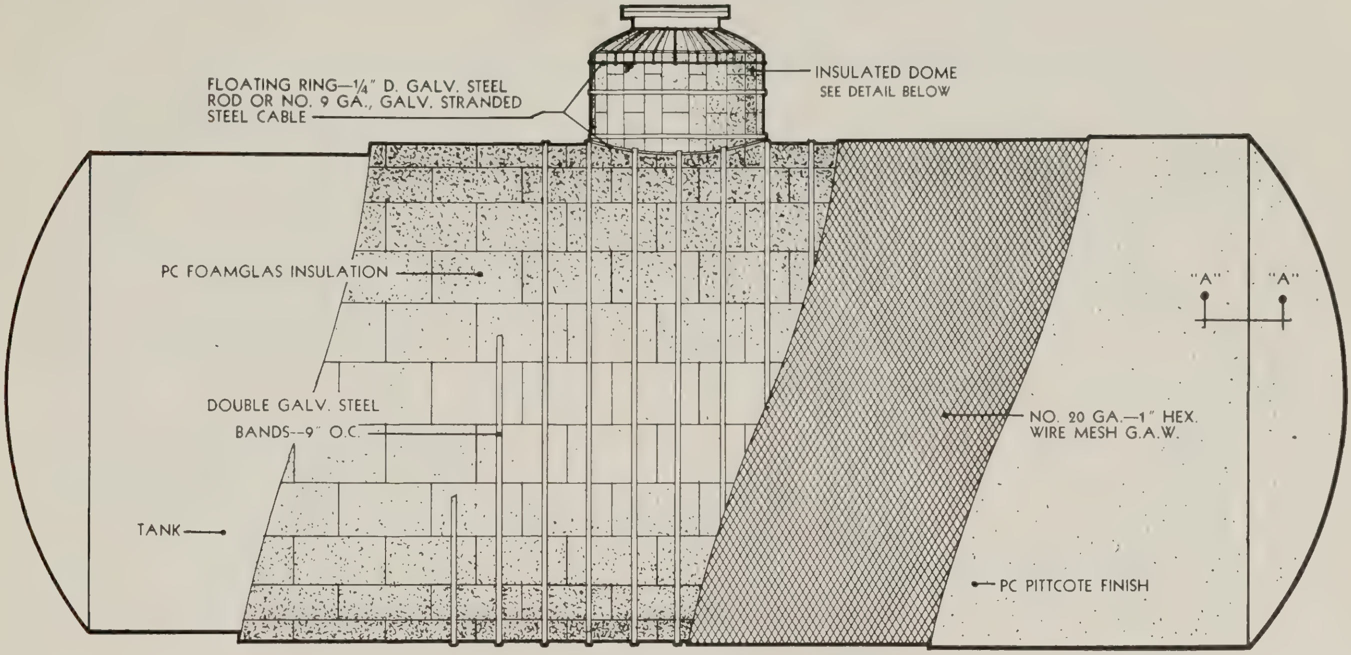
SECTION SHOWING INSULATION ON HEAD & SKIRT

STUD DETAIL

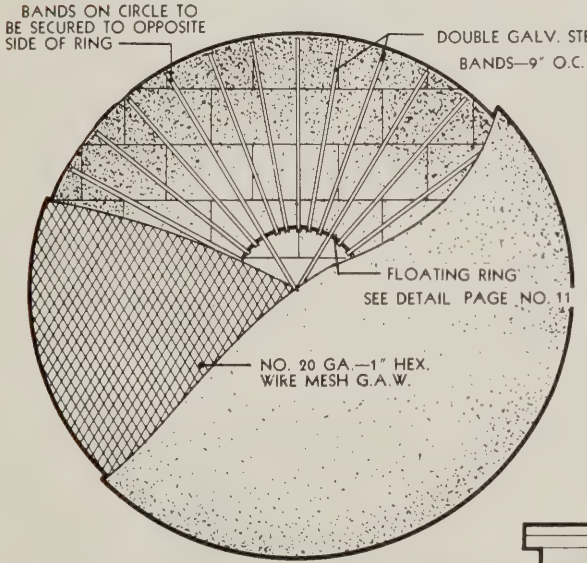
DETAIL OF HAIRPIN

For Specifications see page 19

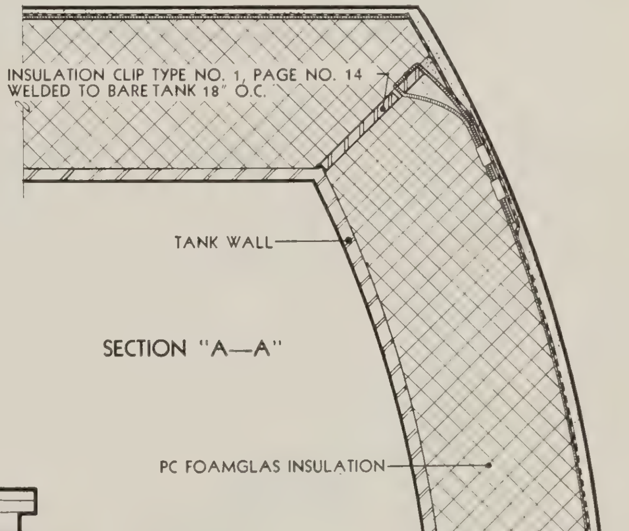
DETAILS FOR INSULATING HORIZONTAL TANKS UP TO 800°F.


FLOATING RING—¼" D. GALV. STEEL ROD OR NO. 9 GA., GALV. STRANDED STEEL CABLE
INSULATED DOME SEE DETAIL BELOW
PC FOAMGLAS INSULATION
"A"
"A"
DOUBLE GALV. STEEL BANDS—9" O.C.
NO. 20 GA.—1" HEX. WIRE MESH G.A.W.
TANK
PC PITTCOTE FINISH

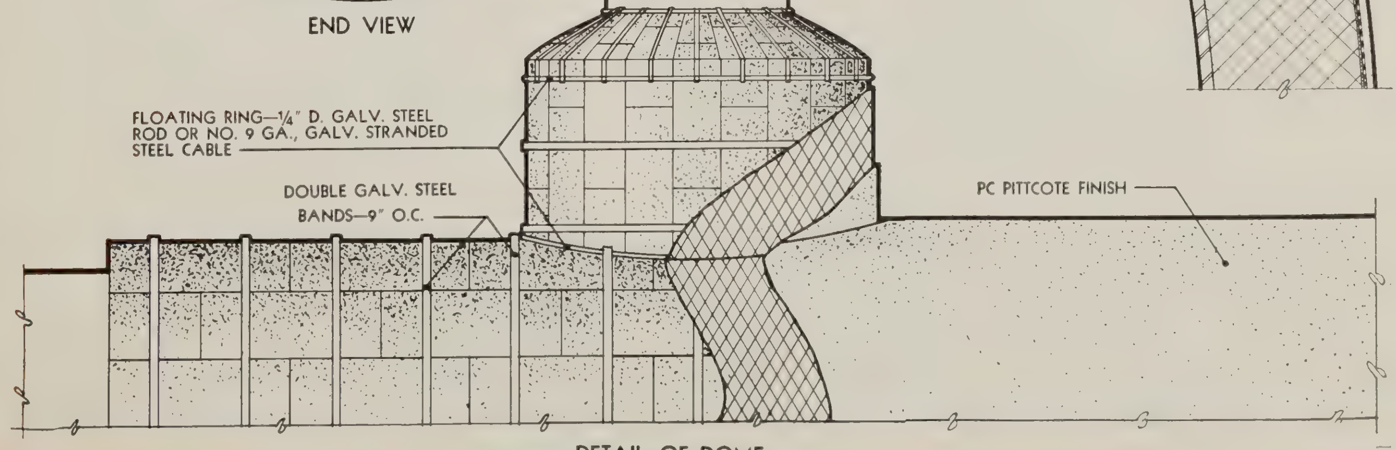
SIDE VIEW


BANDS ON CIRCLE TO BE SECURED TO OPPOSITE SIDE OF RING
DOUBLE GALV. STEEL BANDS—9" O.C.
FLOATING RING SEE DETAIL PAGE NO. 11
NO. 20 GA.—1" HEX. WIRE MESH G.A.W.

END VIEW


INSULATION CLIP TYPE NO. 1, PAGE NO. 14 WELDED TO BARE TANK 18" O.C.
TANK WALL
PC FOAMGLAS INSULATION

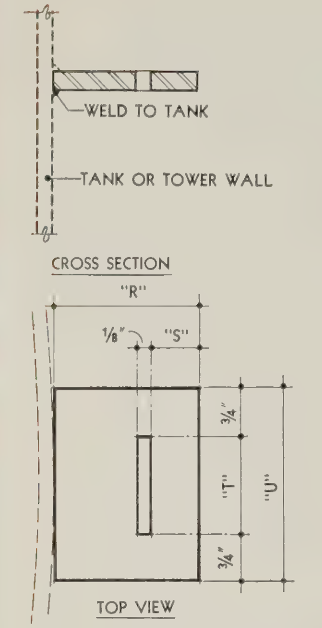
SECTION "A—A"


FLOATING RING—¼" D. GALV. STEEL ROD OR NO. 9 GA., GALV. STRANDED STEEL CABLE
DOUBLE GALV. STEEL BANDS—9" O.C.
PC PITTCOTE FINISH

DETAIL OF DOME

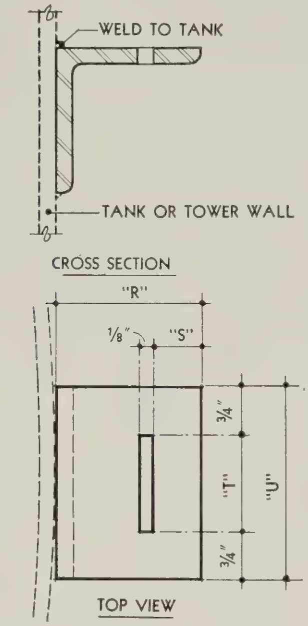
For Specifications see page 21

DETAILS OF INSULATION CLIPS



TYPE NO. 1 INSULATION CLIP

SEE SCHEDULES FOR DIMENSIONS
R, S, T, & U



TYPE NO. 2 INSULATION CLIP

SEE SCHEDULES FOR DIMENSIONS
R, S, T, & U

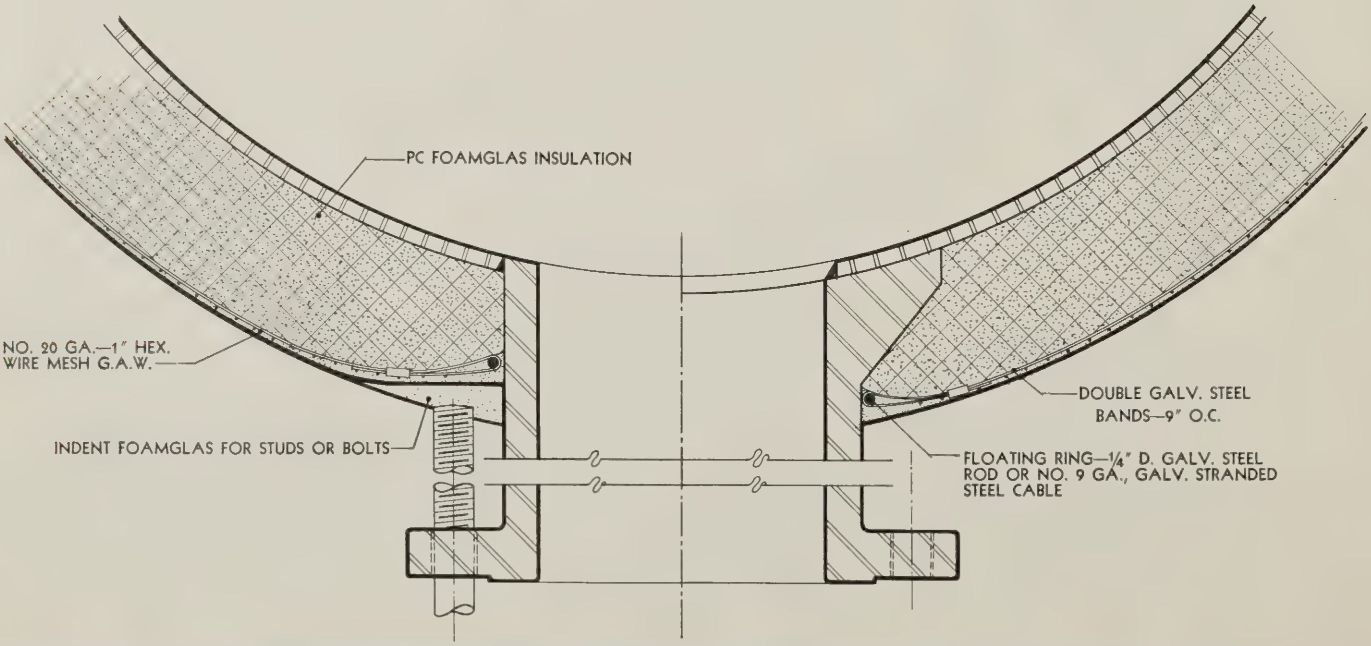
SCHEDULE FOR DIMENSIONS "R" & "S"
BASED ON INSULATION THICKNESS

FOAMGLAS THICKNESS	DIM. "R"	DIM. "S"
2″	1¾″	¼″
3″	2¾″	¼″
4″	3¾″	⅜″

SCHEDULE FOR DIMENSIONS "T" & "U"
BASED ON TANK DIAM. & BAND SIZE

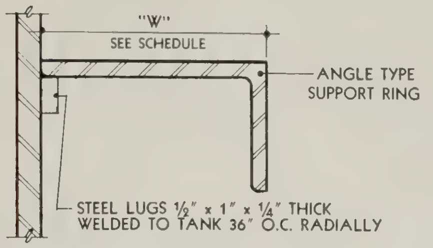
TANK DIAMETER	BAND SIZE	DIM. "T"	DIM. "U"
5 FT. OR LESS	½″ x .015″	⅝″	2⅛″
6 FT. TO 10 FT.	½″ x .020″	⅝″	2⅛″
11 FT. TO 15 FT.	¾″ x .020″	⅞″	2⅜″
16 FT. TO 20 FT.	¾″ x .023″	⅞″	2⅜″
21 FT. TO 25 FT.	¾″ x .028″	⅞″	2⅜″
26 FT. AND OVER	1¼″ x .035″	1⅜″	2⅞″

DETAILS OF INSULATION AT MANHOLE OR NOZZLE USING FLOATING RING AND STEEL BANDS

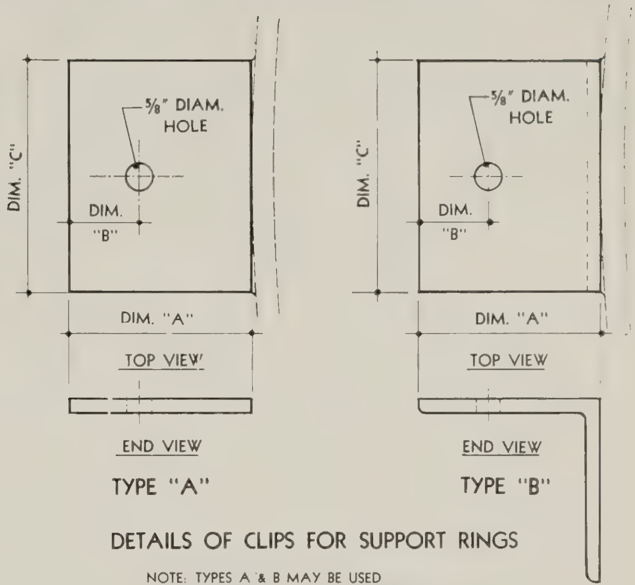


For Specifications see pages 19 & 21

DETAILS OF INSULATION SUPPORT RINGS AND SUPPORT-RING CLIPS


"W"
SEE SCHEDULE
ANGLE TYPE SUPPORT RING
STEEL LUGS ½" x 1" x ¼" THICK WELDED TO TANK 36" O.C. RADIALLY

DETAIL OF LUG METHOD FOR SEATING ANGLE TYPE SUPPORT RINGS



TYPE "A"

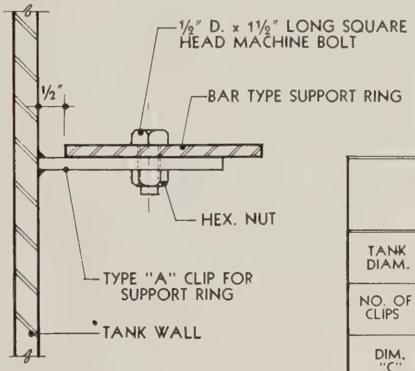
TYPE "B"

DETAILS OF CLIPS FOR SUPPORT RINGS

NOTE: TYPES A & B MAY BE USED INTERCHANGEABLY WITH ANY SUPPORT RING. SEE SCHEDULE FOR DIMENSIONS A, B & C

SCHEDULE FOR DIMENSIONS "A" "B" & "W"
BASED ON INSULATION THICKNESS

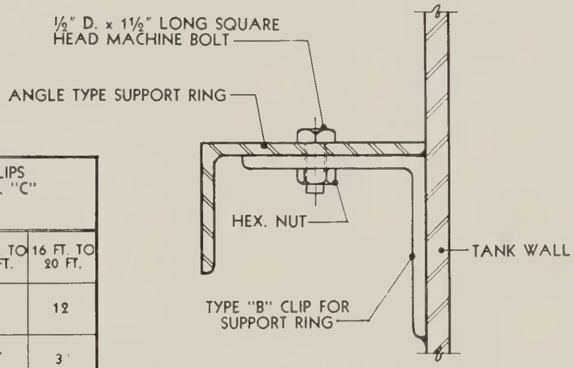
FOAMGLAS THICKNESS	DIM A	DIM. B	SUPPORT RING DIM. "W"	
			BAR TYPE	ANGLE TYPE
2"	1½"	½"	1¾"	2"
3"	2"	¾"	2½"	3"
4"	3"	1¼"	3½"	4"


½" D. x 1½" LONG SQUARE HEAD MACHINE BOLT
BAR TYPE SUPPORT RING
½"
HEX. NUT
TYPE "A" CLIP FOR SUPPORT RING
TANK WALL

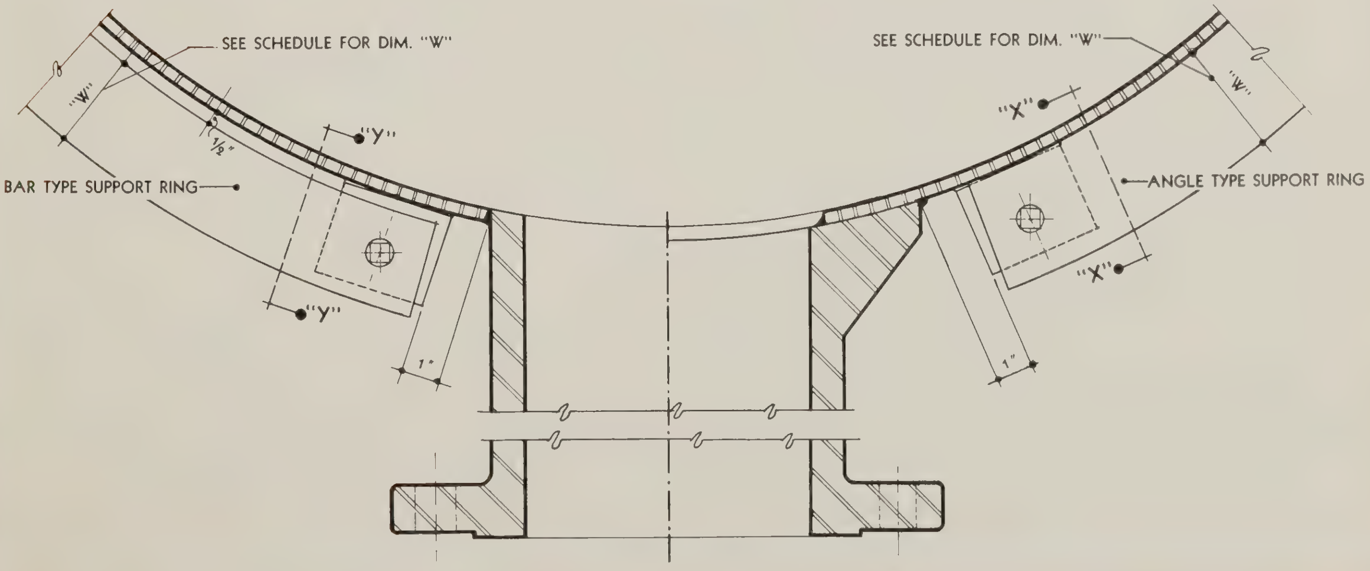
SECTION "Y—Y"

EQUAL RADIAL SPACING OF CLIPS FOR SUPPORT RINGS & CLIP DIM. "C"
BASED ON TANK DIAMETERS

TANK DIAM.	UP TO 4 FT.	4 FT. TO 8 FT.	8 FT. TO 12 FT.	12 FT. TO 16 FT.	16 FT. TO 20 FT.
NO. OF CLIPS	4	6	8	10	12
DIM. "C"	2"	2"	2½"	3"	3"

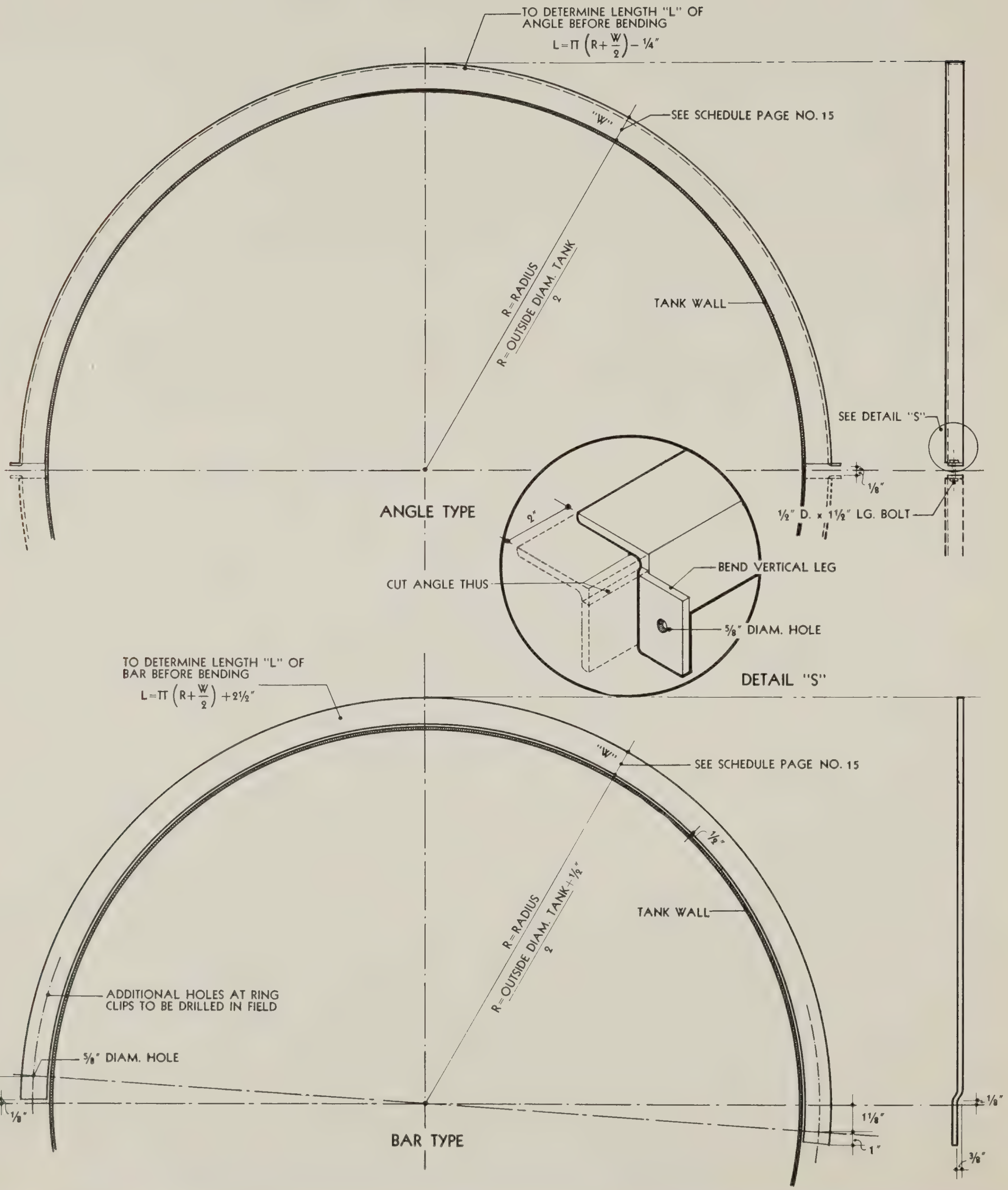

½" D. x 1½" LONG SQUARE HEAD MACHINE BOLT
ANGLE TYPE SUPPORT RING
HEX. NUT
TANK WALL
TYPE "B" CLIP FOR SUPPORT RING

SECTION "X—X"



DETAIL OF SUPPORT RINGS AT OBSTRUCTIONS

DETAILS OF INSULATION SUPPORT RINGS


TO DETERMINE LENGTH "L" OF ANGLE BEFORE BENDING
$L = \pi\left(R + \frac{W}{2}\right) - 1/4''$
"W"
SEE SCHEDULE PAGE NO. 15
R = RADIUS
$R = \frac{\text{OUTSIDE DIAM. TANK}}{2}$
TANK WALL
SEE DETAIL "S"
1/8"
1/2" D. × 1 1/2" LG. BOLT
ANGLE TYPE
2"
CUT ANGLE THUS
BEND VERTICAL LEG
5/8" DIAM. HOLE
DETAIL "S"
TO DETERMINE LENGTH "L" OF BAR BEFORE BENDING
$L = \pi\left(R + \frac{W}{2}\right) + 2 1/2''$
"W"
SEE SCHEDULE PAGE NO. 15
1/2"
R = RADIUS
$R = \frac{\text{OUTSIDE DIAM. TANK} + 1/2''}{2}$
TANK WALL
ADDITIONAL HOLES AT RING CLIPS TO BE DRILLED IN FIELD
5/8" DIAM. HOLE
1 1/8"
1/8"
BAR TYPE
1 1/8"
1"
1/8"
3/8"

PC FOAMGLAS INSULATION

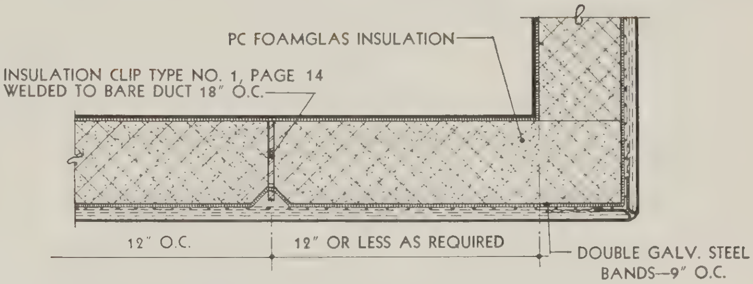
. . . for Ducts and Breeching

The internal heat resistance of metal ducts and breeching is very low, the only appreciable resistance being that of the inner and outer surface air films; and, as a result, they have an exceptionally high rate of heat transfer. This high rate results in faster amortization of insulation cost than most other types of equipment.

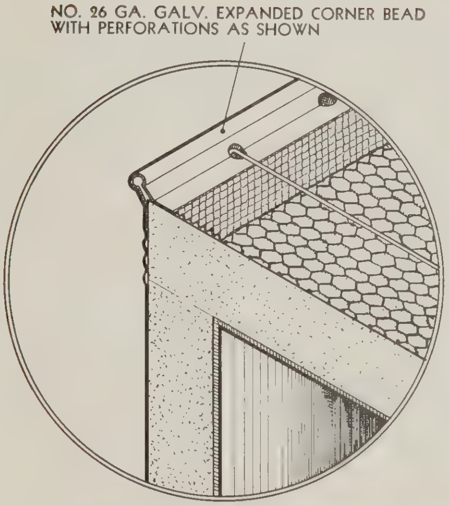
Constant heat resistance under any operating conditions, plus added rigidity, makes Foamglas ideal for this application.

Being a rigid material, Foamglas gives additional support and tends to minimize vibration.

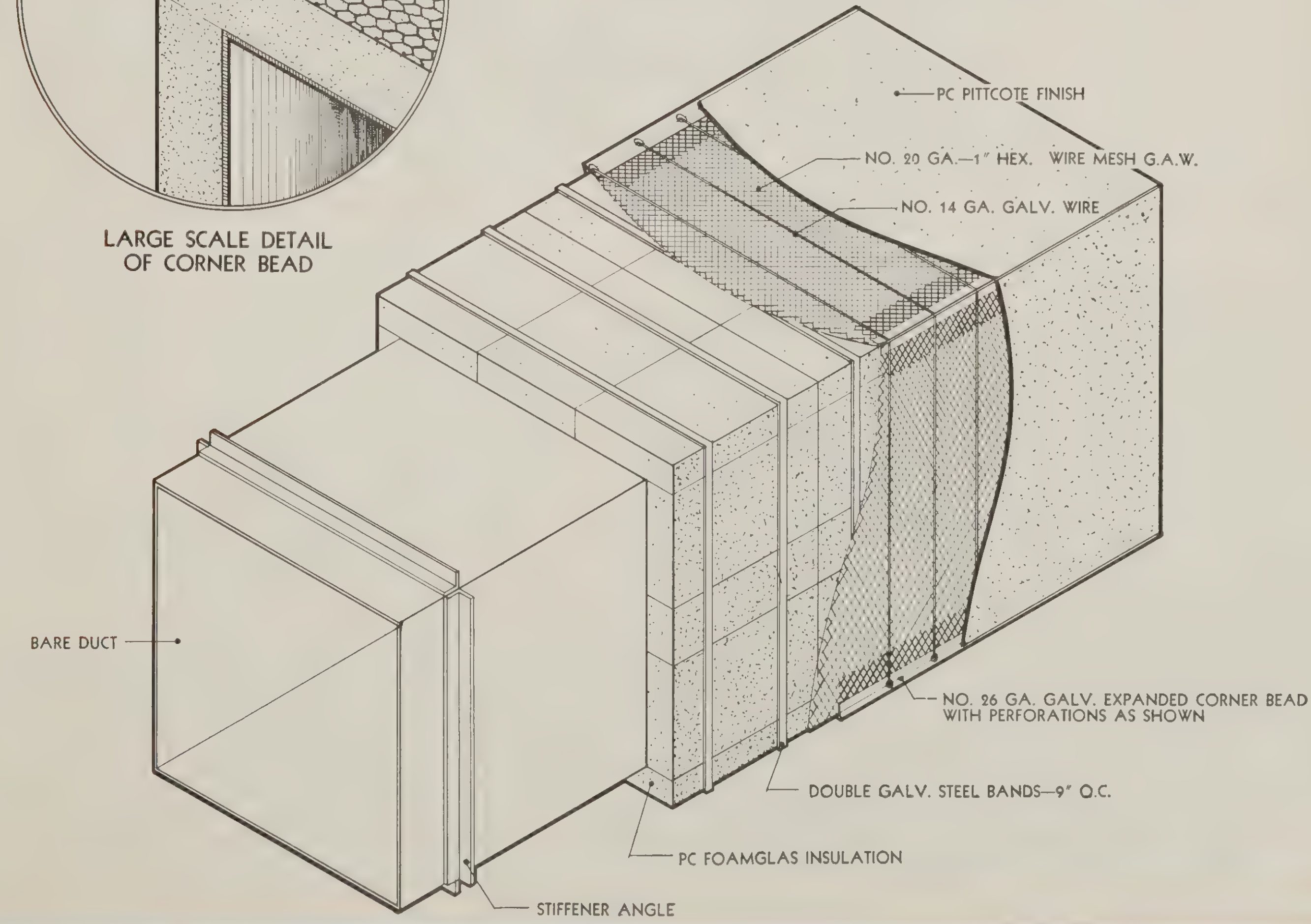
DETAILS FOR INSTALLATION WHERE NO AIR SPACE IS REQUIRED


PC FOAMGLAS INSULATION
INSULATION CLIP TYPE NO. 1, PAGE 14 WELDED TO BARE DUCT 18" O.C.
12" O.C.
12" OR LESS AS REQUIRED
DOUBLE GALV. STEEL BANDS—9" O.C.

DETAIL OF ADDITIONAL SUPPORT FOR INSULATION ON UNDERSIDE OF DUCTS & BREECHING OVER 3 FT. WIDE

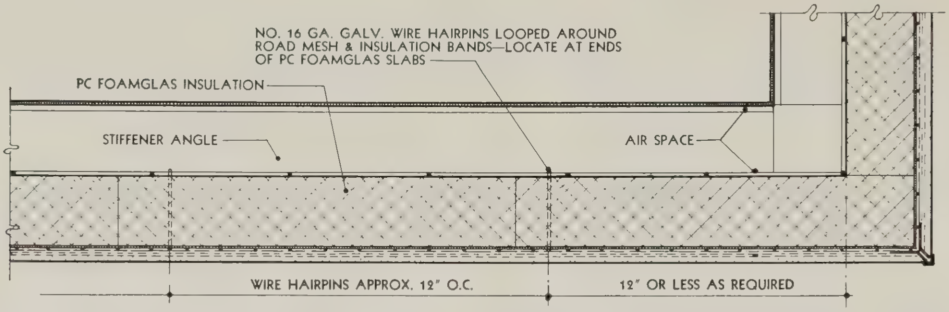

NO. 26 GA. GALV. EXPANDED CORNER BEAD WITH PERFORATIONS AS SHOWN

LARGE SCALE DETAIL OF CORNER BEAD

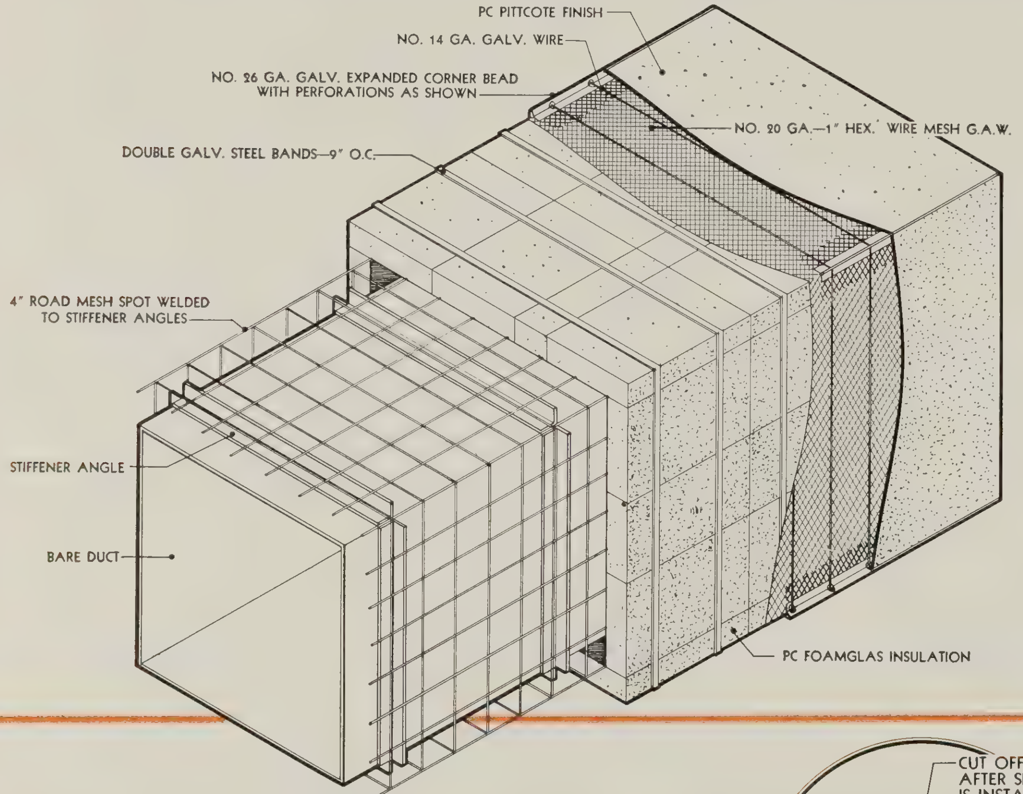

PC PITTCOTE FINISH
NO. 20 GA.—1" HEX. WIRE MESH G.A.W.
NO. 14 GA. GALV. WIRE
BARE DUCT
NO. 26 GA. GALV. EXPANDED CORNER BEAD WITH PERFORATIONS AS SHOWN
DOUBLE GALV. STEEL BANDS—9" O.C.
PC FOAMGLAS INSULATION
STIFFENER ANGLE

For Specifications see page 23

DETAILS FOR INSTALLATION WHERE AIR SPACE IS REQUIRED


NO. 16 GA. GALV. WIRE HAIRPINS LOOPED AROUND ROAD MESH & INSULATION BANDS—LOCATE AT ENDS OF PC FOAMGLAS SLABS
PC FOAMGLAS INSULATION
STIFFENER ANGLE
AIR SPACE
WIRE HAIRPINS APPROX. 12" O.C.
12" OR LESS AS REQUIRED

DETAIL OF ADDITIONAL SUPPORT FOR INSULATION ON UNDERSIDE OF DUCTS & BREECHING OVER 3 FT. WIDE

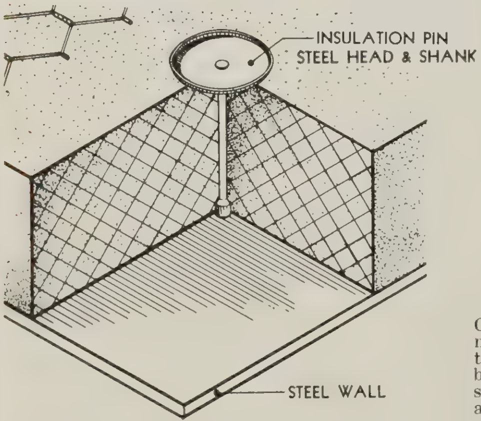

PC PITTCOTE FINISH
NO. 14 GA. GALV. WIRE
NO. 26 GA. GALV. EXPANDED CORNER BEAD WITH PERFORATIONS AS SHOWN
NO. 20 GA.—1" HEX. WIRE MESH G.A.W.
DOUBLE GALV. STEEL BANDS—9" O.C.
4" ROAD MESH SPOT WELDED TO STIFFENER ANGLES
STIFFENER ANGLE
BARE DUCT
PC FOAMGLAS INSULATION

FOR LARGE SCALE DETAIL OF CORNER BEAD SEE PAGE 17

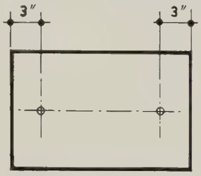
DETAIL FOR INSULATING DUCTS & BREECHING WITH AIR SPACE BETWEEN DUCT AND INSULATION

For Specifications see page 23

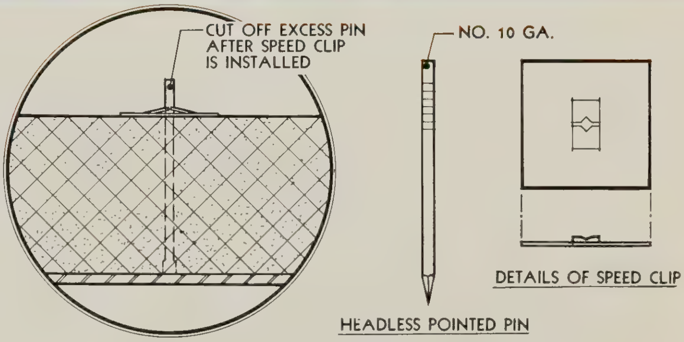
STUD WELDING METHOD OF INSTALLING PC FOAMGLAS INSULATION ON TANKS, TOWERS, DUCTS AND BREECHING



DETAIL OF INSULATION PIN, STEEL HEAD—STEEL SHANK



SPACING OF STUDS



HEADLESS POINTED PIN

DETAILS OF SPEED CLIP

DETAILS OF HEADLESS POINTED PIN & SPEED CLIP

STUD-WELDING APPLICATION

On tanks and towers where welding by this method of No. 10 gauge wire pins is permitted in the field, Foamglas Insulation may be secured by using any of the various types (only two shown) of insulation pins or lagging studs available for this equipment. This method may also be used on ducts and breeching constructed of 18 gauge or heavier sheet metal.

Metal lath studs are also available (not shown) for securing the insulation and expanded metal both on the same stud.

Satisfactory welding to metal covered with two or three coats of paint can be obtained; but, surfaces coated with asphalt or other weatherproofing, scale, or rust, should be cleaned before application of the insulation.

The standard insulation pin can be used only on smooth surfaces; for irregular surfaces use the speed washer.

Note: Stud-welding equipment is manufactured by the Nelson Specialty Welding Equipment Corporation, 440 Peralta Avenue, San Leandro, California. Orders and requests for recommendations or specifications regarding this equipment should be sent direct to the above manufacturer. When ordering insulation pins, specify the Foamglas thickness.

SPECIFICATIONS FOR INSULATING VERTICAL TANKS AND TOWERS UP TO 800°F.

GENERAL

Vertical tanks and towers shall be insulated with PC Foamglas of a specified thickness, over which shall be applied a layer of wire mesh and PC Pittcote Finish.

On tanks or towers operating above 300°F, where the temperature increase exceeds 125°F. per hour, the Foamglas shall be protected by a sufficient thickness of insulating cement to prevent thermal shock in excess of the 125°F. per hour increase.

Expansion joints (see Details Page 10) shall be provided at 8′ to 12′ intervals on tanks or towers operating at 500°F. and above.

On tanks or towers located indoors and not exposed to excessive moisture any *approved* finishing cement may be used.

On tanks or towers exposed to acids or fumes, glass cloth shall be used instead of the bands, wire mesh and PC Pittcote Finish. Specifications for this type application may be obtained for specific jobs from the Pittsburgh Corning Corporation.

PREPARATION OF SURFACE

Slotted Insulation Clips (see Details Page 14) shall be welded on 9″ centers vertically at all manholes, supports, or connections, to provide anchorage for steel bands.

Where elliptical heads are to be insulated on the top of tanks or towers, insulation clips shall be welded on 9″ centers radially at the outside edge of the heads to provide anchorage for steel bands (see Details Page 11).

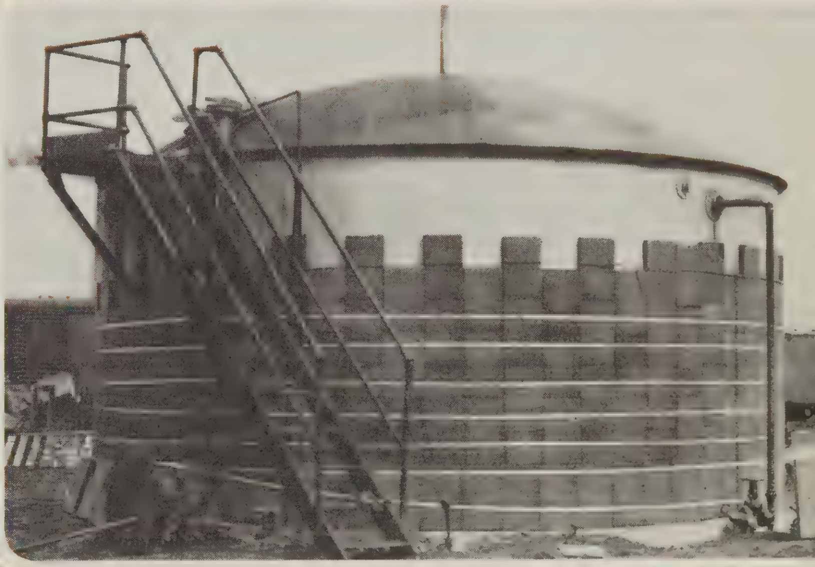
Where dished heads are to be insulated on the bottom of tanks or towers, No. 12 gauge soft annealed iron wire hairpins shall be welded directly to the shell on approximately 9″ x 12″ centers. One leg of the hairpin shall be bent over to support the insulation, the other leg shall be used to support the wire mesh. The legs of the hairpins shall be at least 2″ longer than the insulation thickness (see Details Page 12). If preferred, the insulation may be applied with clips and bands in the same manner as specified for top heads.

When insulation is specified on the inside of the skirt, Studs made of No. 12 gauge soft annealed iron wire shall be welded directly to the inside of the skirt on approximately 12″ centers radially and 9″ vertically. The wires shall be bent to form a 90° right angle, with the short leg of the angle (about 1″ long) welded to the inside surface. The other leg of the angle shall protrude at right angles to the skirt to a distance 2″ greater than the insulation thickness (see Details Page 12).

Support rings or rods shall be provided at all expansion joints (see Details Pages 10, 15, 16). Support rings shall be used where skirts are not insulated (see Details Page 12).

MATERIALS

Insulation: The insulation shall be PC Foamglas blocks 18″ long, by 3″, 6″ or 12″ wide, by . . . ″ thick, or circular segments 18″ long, by 12″ wide, by . . . ″ thick.



Bands: The bands shall be double galvanized steel. The thickness and width depend on the diameter, as shown in the following table:

Tank Diameter	Band Size
5′ or less	½″ x .015″
6′ to 10′	½″ x .020″
11′ to 15′	¾″ x .020″
16′ to 20′	¾″ x .023″
21′ to 25′	¾″ x .028″
26′ and over	1¼″ x .035″

Seals: The seals shall be double galvanized insulation seals of a size in proportion to the bands, but in no case shorter than one inch.

Wire Mesh: The wire mesh shall be No. 20 gauge 1″ hex galvanized after weaving.

Finish: The finish shall be PC Pittcote.

Paint (optional): The paint shall be "Ironhide," red or gray, as manufactured by the Pittsburgh Plate Glass Company.

THICKNESS OF INSULATION

The thickness of insulation recommended in the following table refers to the Foamglas only. It does not include any cement or finish:

Temperature Range °F.	Thickness in Inches
300 and below	2″
301 to 600	3″
601 to 800	4″

APPLICATION

The base course of blocks shall bear on a shelf angle or similar element.

The base course of blocks shall be applied vertically around the bottom of the tank or tower with alternate 9″ and 18″ blocks, so that the horizontal joints in the first and succeeding courses shall be broken.

The second and succeeding courses shall be made with 18″ blocks.

When the insulation is applied in two or more layers, all joints in the successive layers shall be broken with respect to each other.

The first course shall be held in place temporarily by a rope having a coil spring insert. The succeeding courses will be held in place by friction between the blocks, and the rope-holding device should not be required.

After the first course is in place, the first steel band shall be applied 4½″ from the bottom of the blocks and 9″ on centers thereafter. Each course shall be banded before the succeeding course is applied.

The bands shall be machine stretched and sealed with two seals for each connection.

The insulation inside the skirt shall be applied by impaling the blocks over the No. 12 gauge wire studs and bending the protruding wire back to clinch it after the insulation is in place.

The insulation on the top heads shall be secured by banding from the clips on outside edge of the heads to a floating ring in the center. The diameter of the ring shall be sufficient to accommodate the size and number of bands based on the 9″ spacing at the outside edge. The floating ring may also be used to anchor bands around manholes and connections.

The floating ring shall be made from ¼″ galvanized steel rod or No. 9 gauge galvanized stranded steel cable.

The insulation inside the floating ring shall be secured by fastening at least four bands to the opposite side of the ring from which they would normally be attached.

After the insulation has been permanently banded, a layer of wire mesh shall be applied over the surface, tightly stretched and securely laced at all edges with No. 16 gauge galvanized soft iron wire.

The insulation on dished bottom heads shall be applied by impaling on the wire hairpins, bending one leg over to secure the insulation. The other leg shall be used to support the wire mesh.

FINISH

All edges, voids, or open joints, shall be pointed up with PC Pittcote. After the pointing is dry, the entire surface of the insulation shall be covered with PC Pittcote applied in two coats at the rate of one pound per sq. ft. per coat; each coat being approximately ⅛″ thick, when wet. The first coat shall be hand dry before the second coat is applied. Finish all edges clean and true, and trowel all surfaces to a smooth finish.

Pittcote Finish should not be applied when the temperature during application will be below 40°F. Store in a warm place to prevent freezing.

PAINTING

The application of paint should be deferred until the insulated equipment has been operated at the design temperature for a sufficient length of time to thoroughly dry out all components of the installation.

SPECIFICATIONS FOR INSULATING HORIZONTAL TANKS UP TO 800°F.

GENERAL

Horizontal tanks shall be insulated with PC Foamglas of a specified thickness over which shall be applied a layer of wire mesh and PC Pittcote Finish.

On tanks operating above 300°F., where the temperature increase exceeds 125°F. per hour, the Foamglas shall be protected by a sufficient thickness of insulating cement to prevent thermal shocks in excess of the 125°F. per hour increase.

Expansion joints (see Details Page 10) shall be provided at 8 ft. to 12 ft. intervals on tanks operating at 500°F. and above.

On tanks located indoors and not exposed to excessive moisture, any *approved* finishing cement may be used.

On tanks exposed to acids or fumes, glass cloth shall be used instead of the bands, wire mesh and PC Pittcote Finish. Specifications for this type application may be obtained for specific jobs from the Pittsburgh Corning Corporation.

PREPARATION OF SURFACE

Slotted insulation clips (see Details Page 14) shall be welded on 9″ centers radially at the outside edge of the heads and around all domes or connections, to provide anchorage for steel bands. The clips are to be placed around the manholes and domes so that the 9″ spacing of the bands will not be interrupted.

MATERIALS

Insulation: The insulation shall be PC Foamglas blocks 18″ long, by 3″, 6″ or 12″ wide, by . . . ″ thick, or circular segments 18″ long, by 12″ wide, by . . . ″ thick.

Bands: The bands shall be double galvanized steel. The thickness and width depends on the diameter of the tank as shown in the following table:

Tank Diameter	Band Size
3′ or less	½″ x .015″
4′ to 6′	½″ x .020″
7′ to 10′	¾″ x .020″
10′ to 15′	¾″ x .023″
over 15′	1¼″ x .035″

Seals: The seals shall be double galvanized insulation seals of a size in proportion to the bands, but in no case shorter than one inch.

Wire Mesh: The wire mesh shall be No. 20 gauge 1″ hex galvanized after weaving.

Finish: The finish shall be PC Pittcote.

Paint (optional): The paint shall be "Ironhide," red or gray, as manufactured by the Pittsburgh Plate Glass Company.

THICKNESS OF INSULATION

The thickness of insulation recommended in the following table refers to the Foamglas only. It does not include any cement or finish.

Temperature Range °F.	Thickness in Inches
300 and below	2″
301 to 600	3″
601 to 800	4″

APPLICATION

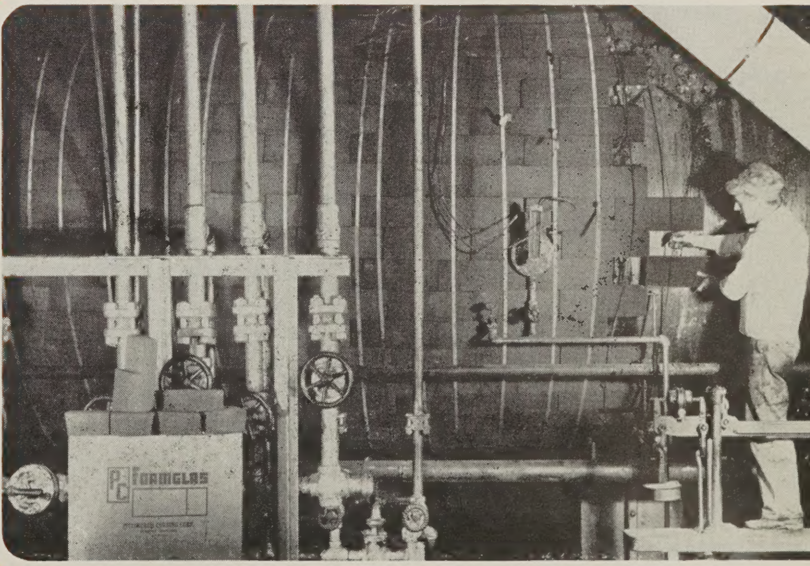
The first course of blocks shall be applied horizontally around the end of the tank in alternate 9″ and 18″ blocks so that the vertical joints in the first and successive courses shall be broken.

The second and succeeding courses shall be made with 18″ block.

When the insulation is applied in two or more layers, all joints in the successive layer shall be broken with respect to each other.

The first and succeeding courses shall be held temporarily in place by a rope having a coil spring insert. After the first course is in place, the first steel band shall be applied 4½″ from the end of the blocks and 9″ on centers thereafter. Each course shall be banded before the succeeding course is applied.

The bands shall be machine stretched and sealed with two seals for each connection.



The insulation on the heads shall be secured by banding from the clips on outside edge of the heads to a floating ring in the center. The diameter of the ring shall be sufficient to accommodate the size and number of bands based on the 9″ spacing at the outside edge. The floating ring may also be used to anchor bands around domes and connections.

The floating ring shall be made from ¼″ galvanized steel rod or No. 9 gauge galvanized stranded steel cable.

The insulation inside the floating ring shall be secured by fastening at least four bands to the opposite side of the ring from which they would normally be attached.

After the insulation has been permanently banded, a layer of wire mesh shall be applied over the surface, tightly stretched and securely laced at all edges with No. 16 gauge galvanized soft iron wire.

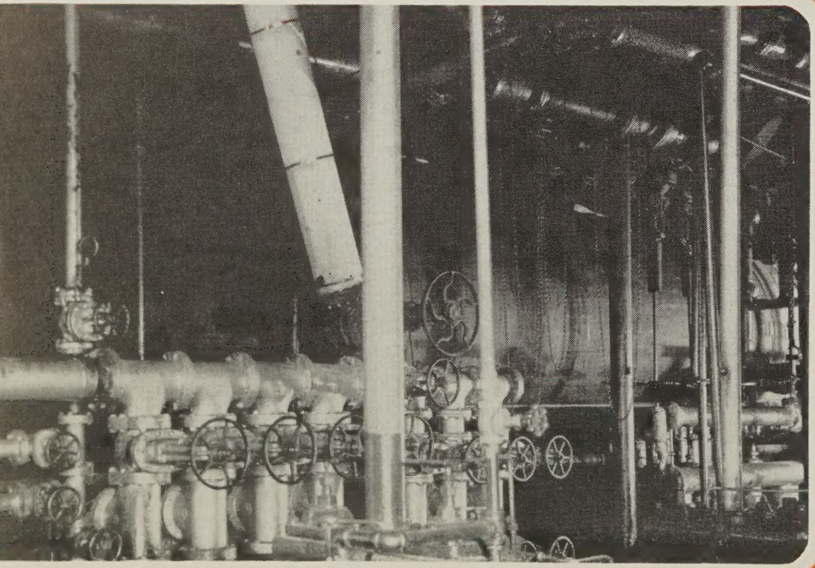
FINISH

All edges, voids, or open joints shall be pointed up with PC Pittcote. After the pointing is dry, the entire surface of the insulation shall be covered with PC Pittcote applied in two coats at the rate of one pound per sq. ft. per coat; each coat being approximately ⅛″ thick, when wet. The first coat shall be hand dry before the second coat is applied. Finish all edges clean and true, and trowel all surfaces to a smooth finish.

Pittcote Finish should not be applied when the temperature during application will be below 40°F. Store in a warm place to prevent freezing.

PAINTING

The application of paint should be deferred until the insulated equipment has been operated at the design temperature for a sufficient length of time to thoroughly dry out all components of the installation.



SPECIFICATIONS FOR THE

GENERAL

Ducts and breeching located outdoors shall be insulated externally with PC Foamglas of a specified thickness over which shall be applied a layer of wire mesh and PC Pittcote Finish.

On ducts and breeching located indoors, not exposed to excessive moisture, any *approved* finishing cement may be used. Do not use any finish which develops high shrinkage when setting.

On ducts or breeching operating above 300°F., where the temperature increase exceeds 125°F. per hour, the Foamglas shall be protected by a sufficient thickness of insulating cement to prevent thermal shock in excess of the 125°F. per hour increase.

MATERIALS

Insulation: The insulation shall be PC Foamglas blocks 18″ long, by 3″, 6″ or 12″ wide, by . . . ″ thick, or circular segments 18″ long, by 12″ wide, by . . . ″ thick.

Bands: The bands shall be double galvanized steel. The thickness and width depends on the diameter as shown in the following table:

Duct Diameter	Band Size
5′ or less	½″ x .015″
6′ to 10′	¾″ x .015″
11′ to 15′	¾″ x .020″
16′ to 20′	¾″ x .023″
21′ to 25′	¾″ x .028″
26′ and over	1¼″ x .035″

Seals: The seals shall be double galvanized insulation seals of a size in proportion to the bands, but in no case shorter than one inch.

Corner Bead: The corner bead shall be No. 26 gauge galvanized, expanded plasterers bead with perforations through the outer angle.

Wire Mesh: The wire mesh shall be No. 20 gauge 1″ hex galvanized after weaving.

EXTERNAL INSULATION OF METAL DUCTS AND BREECHING UP TO 800°F.

Finish: The finish shall be PC Pittcote.

Paint (optional): The paint shall be "Ironhide," red or gray, as manufactured by the Pittsburgh Plate Glass Company.

THICKNESS OF INSULATION

The thickness of insulation recommended in the following table refers to the Foamglas only. It does not include any cement or finish.

Temperature Range °F.	Thickness in Inches
300 and below	2″
301 to 600	3″
601 to 800	4″

PREPARATION OF SURFACE

Angle-iron stiffeners shall be fastened to the ducts at regular intervals to prevent vibration and excessive warping.

At cleanout doors and other openings, angles of a depth equal to the insulation thickness shall be fastened to the duct to form a frame around the opening. The two angles parallel to the edges of the duct shall be slotted so that the 9″ spacing of the bands will not be interrupted.

On the curved surfaces of uptakes, on transverse sections and on the bottom of rectangular ducts wider than 36″, insulation clips shall be welded to the duct on 12″ x 18″ centers, the spacing to conform to the block dimensions.

When an air space is desired between the surface of the duct and the insulation, the duct or breeching shall first be covered with a layer of heavy gauge 4″ road mesh applied over the tops of the stiffener angles and welded securely in place as outlined in Detail Page 18 before the Foamglas blocks are applied. In this case insulation clips shall be omitted, and the insulation supported by No. 16 gauge galvanized wire looped around the road mesh and the bands.

APPLICATION

As shown in Detail Pages 17 and 18, the Foamglas blocks shall be applied lengthwise, with closely fitted joints. The blocks shall be held in place temporarily by a rope having a coil spring insert, then secured in place with steel bands on 9″ centers. Each course shall be banded before the succeeding course is applied.

The bands shall be machine stretched and sealed using two seals for each band.

After the insulation has been permanently banded, a layer of wire mesh shall then be applied over the entire surface, tightly stretched and securely laced at all edges with No. 16 gauge galvanized soft iron wire.

Corners of rectangular ducts shall be covered with corner bead, secured with No. 14 gauge galvanized wire drawn over the perforations as shown in Detail Page 17.

FINISH

All edges, voids, or open joints, shall be pointed up with a good grade of insulating cement. After the pointing is dry, the entire surface of the insulation shall be covered with PC Pittcote applied in two coats at the rate of one pound per sq. ft. per coat; each coat being approximately 1/8″ thick, when wet. The first coat shall be hand dry before the second coat is applied. Finish all edges clean and true, and trowel all surfaces to a smooth finish.

Pittcote Finish should not be applied when the temperature during application will be below 40°F. Store in a warm place to prevent freezing.

PAINTING

The application of paint should be deferred until the insulated equipment has been operated at the design temperature for a sufficient length of time to thoroughly dry out all components of the installation.

POTENTIAL USES OF PC FOAMGLAS

While almost all of our present production is being consumed by the primary uses listed in this booklet, we want to cooperate with product design engineers in their future planning.

In addition to the present applications, there are many uses yet to be developed and even discovered. Indicative of the versatility and adaptability of this basic material is the wide variety of uses developed in the past five years, ranging from under water sound deflection to a gas barrier for electrolytic baths.

If your problem involves a service similar to those mentioned above or a material having the properties of a true glass in this form, it will pay you to investigate Foamglas. Samples are available. Your correspondence is invited.

PROMINENT USERS OF PC FOAMGLAS

The firms listed below are among the prominent users of PC Foamglas

Northern Pacific Railway
Cannon Mills Company
B. F. Goodrich Company
Proctor & Gamble
Hinde & Dauche Paper Co.
Kendall Refining Company
Southern Kraft Div. of International Paper Co.
Southwestern Bell Telephone Co.
Firestone Tire & Rubber Co.
Westinghouse Electric Corp.
Goodyear Tire & Rubber Co.
Worthington Pump & Machinery Corp.
A. E. Staley Manufacturing Co.
Columbia Chemical Div. of Pittsburgh Plate Glass Company
Behr-Manning Div. of Norton Company
International Business Machines Corp.
Diamond Match Company
U. S. Rubber Company
West Virginia Pulp & Paper Co.
E. I. duPont DeNemours & Co., Inc.
Socony-Vacuum Oil Company
Ansco Film & Manufacturing Corp.
Package Machinery Corporation
The Maytag Company
Cornell University
City of Houston, Texas
Grand Rapids Store & Equipment Co.
Bowling Green University
Crowell-Collier Publishing Co.
Federal Reserve Bank of Memphis
John Morrell & Company
Mohawk Milk Co. (Carnation Milk Co.)
U. S. Radiator Corp.

PC FOAMGLAS

INSULATION FOR TANKS, TOWERS, DUCTS AND BREECHING

Manufactured by

PITTSBURGH CORNING CORPORATION
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